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[OFFICIAL NOTICE.]

Sixth Annual Meeting, Pacific Coast Gas Association.

OFFICE OF THE SECRETARY,
OAKLAND, CAL., June 6, 1898.

The sixth annual convention of the Pacific Coast Gas Association, Mr. F. H. Eichbaum, President, will be held in San Francisco, on Tuesday and Wednesday, July 19 and 20, 1898, in the office building of the San Francisco Gas and Electric Company; morning sessions, from 10:15 to 12:30; afternoon sessions, 2 to 4:30. The Board of Directors will meet on Monday, July 18, at 8 P.M., at headquarters, which are hereby established at office of Mr. E. C. Jones, Chief Engineer San Francisco Gas and Electric Company, No. 413 Post street.

Copies of all papers, questions and applications for membership must be mailed to Secretary prior to July 18. Members to whom questions are assigned are requested to send answers promptly.

Papers will be submitted by the following members, on subjects to be announced:

E. C. Jones, San Francisco, Cal.; C. O. Poole, San Francisco, Cal.; John L. Howard, San Francisco, Cal.; O. M. Gregory, San Jose, Cal.; F. Foveaux, San Francisco, Cal.; John A. Britton, Oakland, Cal.; W. M. Parker, Bellingham Bay, Wash.; A. Gutsch, Fresno, Cal. In addition to his address as President, Mr. Eichbaum will continue his "Reminiscences."

Mr. George H. Hollidge, of Merced, Cal., has charge of "Wrinkles," and Mr. John Clement, of Red Bluff, Cal., is directing the "Experiences." It is hoped the members will contribute liberally to both of these departments.

An excursion is arranged for Thursday, July 21, particulars of which will be hereafter announced.

The Secretary has on hand a number of bound copies of the "Proceedings," which are purchasable at $2 per copy.

JOHN A. BRITTON, Secretary.

[OFFICIAL NOTICE.]

Wrinkle Department, Pacific Coast Gas Association.

MERCED, CAL., March 11, 1898.

To the Members of the Pacific Coast Gas Association: At the last meeting of the Pacific Coast Gas Association to me was delegated the duty of collecting and presenting any matter, in the shape of original ideas or special devices, which may come under the head of "Wrinkles," to be presented in proper form for the benefit of the Association at the next regular assembly.

Many of our members having charge of gas plants on the Coast have many plans, that are practical, handy and labor-saving, which many others by force of circumstances have never seen, but who, on presentation of the device, drawn and described, or through the medium of our official organ (the AMERICAN GAS LIGHT JOURNAL), would gladly embrace the opportunity, and put into practice a plan very beneficial—which perhaps had been in use in some obscure place many years, used exclusively by one man—that would, when given daylight, benefit the whole gas fraternity.

On reading this communication, please see if you have not forgotten something in the shape of a "Wrinkle," that is doing good service in your works, that would be of great importance to the Association. Your answer to this will greatly oblige.

GEORGE H. HOLLIDGE,
Editor "Wrinkle" Department.

BRIEFLY TOLD.

DEATH OF PHILIP LUCAS, JR.—We regret to report the death of Mr. Philip Lucas, who died at his home in Mount Vernon, N. Y., on the morning of the 17th inst. Not many who read these lines will recall the personality of their subject, for deceased was never pushingly prominent in the early days of his service in and to the industry which he so faithfully followed; and as it was with him in the beginning, so it was to the end. His knowledge of the gas industry was acquired under arduous conditions, or those not conducive to early display and self-publication, wherefore the ease of his later days was all the more serene. Mr. Lucas was for many years Superintendent of the East Chester Gas Light Company, of Mount Vernon, N. Y., when that property was under the direct control and ownership of the late Mr. Charles Nettleton, whose services in connection with the Secretarial desk of the American Association can never be over-estimated. Mr. Lucas joined the American Association at its fifteenth annual meeting (New York, 1887), and in that affiliation he maintained the quietude which marked his career. A man of resolution, of quiet purpose and of honor, he passed away, in his 62d year, earnestly and reverently mourned by those who knew him nearest. The funeral services were held at his late residence, on the afternooon of last Tuesday, and the interment was subsequently made at Woodlawn cemetery, the ceremonies at the grave being conducted under the direction of Hiawatha Lodge, F. and A. M.

MR. EGNER'S PAPER ON "HINDRANCES TO THE ADOPTION OF THE INCLINED RETORT SYSTEM IN AMERICA."—The paper by Mr. Egner, on the matters named in the caption, which was read before the last meeting of the Western Gas Association (the text of it is given in our current and concluding chapters of that meeting), is well worth reading. There is nothing of technicality in it, and that which it seeks to convey is so clearly put that many a gas engineer may be pardoned for "smiling to himself," even though that indulgence may be closely allied to grinning at his employers. Nor may the "smile" arise from the fact that the "smiler" did not have the subject or thought of inclined retorts in his mind at all. To our belief, Mr. Egner has made out a pretty good presentment of the things that cause the hindrances in this country to the introduction of the inclined retort system; but to his list he might have added one other—that in many of our companies the financial controllers thereof know more about bond making than they do of gas making. And the sum and purpose of such knowledge are fatal towards keeping a gas plant—be it on the coal gas or water gas basis—in sound physical condition.

NOTES.—The result of the last annual meeting of the Trenton (N. J.) Gas Light Company portends a complete reorganization of that corporation. The Directors elected were: William S. Hancock, Washington A. Roebling, Barker Gummere, Jas. P. Stephens and Chas. H. Swan. The only survivor of the old Board is Mr. Hancock, who was elected some time ago to fill the vacancy occasioned by the death of Dr. Chas. E. Green. The organization of the Board was to have been perfected to-day, and the understanding is that Mr. Hancock will be elected President. Rumor has it that the Messrs. Chambers will not be re-elected, which we hope will not come true. In any event, it is quite determined on that important plant betterments will be made.——We have received from the D. Van Nostrand Company, of this city, a copy of the book, by Mr. William E. Gibbs, M.E., on "Lighting by Acetylene." It is about as good as anything else in that line that we have received. Its price is $1.50.——Mr. D. W. Chamberlain, formerly President of the Cambridge (Mass.) Gas Light Company, died on the 14th inst. He was born in Cambridge, in 1824, and for 50 years was prominent in the banking business of the Cambridge district. At the time of his death he was President of the First National Bank, of Cambridge. He was prominent in the social life of Cambridge, and was also closely identified with its charities.——The plant of the Paris (Texas) Gas and Electric Light Company was recently sold to Judge D. H. Scott, who represented one half of the bondholders, as attorney, and the other half as Trustee. The amount bid was $30,000.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—Concluded from Page 941.]

PROCEEDINGS, TWENTY-FIRST ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD AT THE RUSSELL HOUSE, DETROIT, MICH., MAY 18, 19 AND 20, 1898.

SECOND DAY, MORNING SESSION.

Discussion on the Paper by[1] Mr. O. O. Thwing.

The President—Mr. J. R. Lynn should have something to say on the matters discussed in Mr. Thwing's paper.

Mr. J. R. Lynn—I do not know that I have any comment to offer on Mr. Thwing's very commendable paper. I think though it is time we all fully realized the importance of the subject of ammoniacal liquor to the gas industry, especially when we take into consideration the fact that quite a number of gas companies throughout the country are deriving as much, if not more, from this residual than they are deriving from coal tar. Respecting the Twaddel test my experience goes to show that it is inaccurate, even as to the estimating of the common or weak gas liquor obtained in the works. Invariably I have found that the saturation test would indicate a much higher strength than the Twaddel test would upon the weak liquor. In fact, I believe it is about time we drop the Twaddel test altogether. This test merely gives us an approximation of specific gravity, but we know that the liquor may contain many matters in solution which might either raise or reduce specific gravity. For instance, quite a large percentage of sulphur and hydrogen, taken up in absorption in the scrubbers, would tend to change the specific gravity. In our case we have always measured the strength according to the number of ounces of sulphuric acid required to neutralize a gallon of liquor. We employed the saturation test altogether, which was the test recommended by Mr. George Shepard Page at the time he placed the Clapp concentrator in our works, but which I think is probably almost as inapplicable to the concentrated liquor as the Twaddel test is to the weak liquor. I am quite surprised that so few coal gas companies are utilizing their liquor. I think this paper should bring to the minds of many members present who are not doing anything on this line the importance of utilizing one of the most valuable residuals that they produce. In my experience I have found it very good policy, in working the concentrator, to make occasional tests from time to time of the water that passes over. I think that by frequent tests of the type suggested a great deal of the ammonia can be saved. On the other hand, a little carelessness will occasion quite a bit of loss in profits.

Mr. Somerville—Mr. Thwing, on page 6 of his paper, makes a point that I do not quite understand. He said that in using the Twaddel hydrometer, allowing 2 ounces strength for each degree at 60° F., he would add 1 ounce for safety, and call it 7-ounce liquor. Why does he add that ounce. It appears to me just now that perhaps it ought to be reversed. There is no doubt that the liquor contains a very large amount of sulphureted hydrogen, which, in my opinion, increases the density or specific gravity, and certainly the hydrometer should show it. In other words, if I were to purchase liquor by the Twaddel hydrometer test I would be careful on that score. Just a word of caution, from my experience about taking out all the ammonia. When I tried to take it all out I found that the gas would not stand the scrubbing and washing. I found it more profitable to retain those hydrogen-carbons in the gas than to precipitate them by taking out a few more pounds of sulphate.

Mr. Doty—I think we will all agree that a paper of the character of Mr. Thwing's presentation carries with it a lesson, and has some points of view which make it of value. The lesson it has for some (supplementing Mr. Thwing's work) is the desire to correlate the terms used, which is suggested in the statement that "contracts are usually made at a stated sum per 100 ozs., per pound of ammonia or per pound of 20 per cent. liquor. * * * The amount is designated in ounces per gallon, pounds per gallon, or per cent. by weight." A contract has been defined as an agreement, upon sufficient consideration, to do or not to do a particular thing, and one of the essential elements is mutuality, or a mutual understanding, or a meeting of the minds of the parties. Now, where the valuation of the liquors may be expressed in three or more measures, the meeting of the minds may be more or less distant, and, however much we may desire to do a particular thing, a confusion of terms may defeat our best intentions. Mr. Thwing has stated the volumetric test of ammoniacal liquors is dependent upon the

1. For Mr. Thwing's paper, see *Ante.*, p. 930.

law of definite proportion of combining weights, and is fixed and unalterable. This gives us a sure starting point, and I give the reactions between ammonia and sulphuric acid:

One.— $2(NH_3)$ (Ammonia.) + H_2SO_4 (Sulphuric Acid.) = $(NH_4)_2SO_4$ (Ammonium Sulphate.)

$2(17) + 98 = 132$

$34 + 98 = 132$

Two.— $.34694 + 1 = 1.34694$

Three.— $\frac{.34694}{.16} = .02168$

From equation two it will be seen every ounce strength of ammoniacal liquor equals .347 ounces of absolute ammonia; or a liquor running 10 ozs. to the gallon will have 3.47 ozs. of ammonia per gallon. From equation three it will be seen, "if it is required to designate the amount of ammonia in pounds per gallon, multiply the ounce strength by .0217."

Four.— $\frac{1.34694}{.34694} = 3.88.$

From equation four, "To compute the yield of sulphate per gallon, multiply the pounds of ammonia per gallon by 3.88, which will give the sulphate in pounds." To correct pounds of ammonia to per cent. of ammonia we have:

1 gallon water = 8.345 lbs.

Spec. grav. of 1 oz. liquor = 1.0025.

Or 1 gallon 1-oz. liquor = $8.345 \times 1.0025 = 8.36586$ lbs.

Or 8.36586 contain .02168 lb. of ammonia; or .2591 per cent.; or 1 gal. 1-oz. liquor has .2591 per cent. of contained ammonia.

Five.—Or 1 gal. 1-oz. liquor has 3.8595 of strength; or, as frequently stated, 17-liquor = 4-oz. liquor. One gallon 1-oz. strength contains .02168 lbs. NH_3; (6) or 1 gallon of 1-per cent. strength contains $.02168 \times 3.8595 = .08367$ lbs. absolute ammonia.

From equations three and six we obtain pounds of ammonia and per cent. of ammonia from ounces per gallon.

It is stated per cent. of ammonia is the term generally used in contracts for concentrated liquor. There is a growing tendency in contracts of this nature to use the term pounds of ammonia. In both cases there is a drifting away from the ounces standard. Butterfield (*Chem. Gas Manufacture*, p. 325) says: "Objection is often raised to the somewhat arbitrary standard of 'ounce,' used for expressing the strength of gas liquor, and certainly its *raison d'etre* is not now very evident. The system is, however, widely used, and as it no way militates against the delicacy of testing, many of the objections raised to it fall to the ground."

The *raison d'etre* for the ounce standard is, I believe, found in Lunge's statement (*Coal Tar and Ammonia*, p. 594), that the working up of gas liquor has for its aim mostly the production of ammonium sulphate.

Mr. Ferrier—Referring to the methods recommended for the estimation of sulphuric acid, on pages 5 and 6, I may mention another method of gravimetric estimation recommended by Thorpe, which can be readily practiced by those in possession of a balance, and which does not require the careful manipulation of the barium chloride method. Stated briefly, it is to add a measured quantity of the acid to a weighed quantity of the carbonate. The radicle SO_4 is substituted for the radicle CO_3, and the amount of the former is estimated by the difference in weight. It is also recommended by another analyst to precipitate the liquor by basic lead acetate before distilling to prevent appreciable quantities of hydrogen sulphide and cyanide passing over with the distillate.

Mr. H. C. Slater—Sometimes an improper test is made, and that is when the ammoniacal liquor is tested directly from the acid without distillation. That gives you only what is commonly called free ammonia, and not the fixed ammonia, or ammonia in combination with (let us say) sulphuric acid or other acid, such as hydrochloric; and that is set free in the distillation tests.

Mr. H. D. Harper—Does Mr. Thwing find the cochineal indicator equally valuable for determining free ammonia simply, as when using it for a determination of the total.

Mr. Thwing—It indicates the total ammonia. It will indicate the free ammonia in the same way that it will be indicated in the saturation test. As to the point made in regard to the Twaddel test, I may say we must have an excess of acid in this test, and the Twaddel hydrometer is regulated for the British gallon of 12 pounds instead of the American gallon of 8½ pounds, consequently it is short on the test.

Dr. Moss.—I take it that the object of the writer of this paper is to get some special or easy test which when practically applied shall give results which everyone will understand. One point here that perhaps it would be well to mention, and which no doubt Mr. Thwing has overlooked, is that in speaking about the addition of water, he does not tell us that that should be distilled water. Undistilled water may be contaminated to a considerable extent, and consequently the resulting calculations would be all wrong. Another point that it would be well to bring out more fully is the object of distilling with soda. The distillation with soda drives off the fixed ammonia. The free ammonia only will pass over, if distilled without soda. Consequently estimating only free ammonia would show a considerably less amount than is actually present. We have ammonia present in gas liquor as free ammonia, and as ammonia combined with sulphureted hydrogen, in the form of sulphide, and with carbonic acid in the form of carbonate. I think this paper is very practical, very easy to understand, and very simple. I am sure if the methods suggested are followed there will be no trouble in arriving at the correct money value of your liquor.

Mr. Thompson—I do not think Dr. Moss would have thought it necessary to call attention to the necessity for the use of distilled water in laboratory work, if he had been accustomed to use the St. Louis water. If he used the ordinary city water for laboratory work he would never be able to take a color test.

On motion of Mr. Doty, the thanks of the Association were voted to Mr. Thwing.

The President introduced Mr. F. Egner, of Norfolk, Va., who read the following paper on

HINDRANCES TO THE ADOPTION OF THE INCLINED RETORT SYSTEM IN AMERICA.

The governing principle of the inclined system is to set the retorts in an ordinary coal gas bench at such an angle that the natural force of gravity will materially assist the operation of placing the coal into (and withdrawing the coke out of) the retorts, instead of employing expensive and somewhat complicated machinery to do this.

The inclined retort was proposed as early as the year 1804, as may be seen illustrated in "King's Treatise on Coal Gas;" but though evidently possessing the elements of success, these, for want of suitable details requisite to proper application, seem not to have been practicable then, and so the inclined retort (as was the compound engine,[1] for similar reason and about the same time) was discarded as useless. Therefore, the inclined retort was practically dead, until M. Coze, after some years' of experimenting and improving, erected the first settings of approximately successful inclines, at Rheims, France. His bench was far from perfect then, and all who imitated his earlier design met with failure, all failing through about the same causes.

In time M. Coze perfected a number of material improvements, as did others experimenting in the same line, and now the inclined retort system presents to the unprejudiced and otherwise uninterested investigator the most rational means for loading and unloading retorts for the purpose of coking coal, and obtaining the best all-round results imaginable. With this preliminary statement, let me now present the reasons that so eminently practicable and profitable an improvement as this, for the cheapening of carbonizing coal, has not met with the recognition one would with good reason expect in this country.

Various causes operate against this improvement in coal gas manufacture that have to date prevented its adoption in this country. First, is the well-known, and not altogether unreasonable, conservatism of gas companies in general; then, a laudable caution on the part of many executive officers of such companies against recommending expenditures for improvements with which they are not thoroughly conversant; again, some men have a natural inclination to "let well enough alone." A serious drawback to favorable consideration of the inclined retort system is its known earlier failures, which occurred when the Coze system was first introduced. And consequent upon the former are causes of more recent date, to which I shall refer bye-and-bye. The conservatism of gas companies, which is well grounded, as anyone who has been but a few years in the business knows, is largely due to the many wild schemes frequently proposed to make gas for almost nothing, on the part of people whose only practical knowledge of the industry they propose to improve and make wealthy (not forgetting themselves) consists in the experience gained at the counter when paying gas bills. And sometimes it is even less than that. To be sure, once in a while a genuine improvement may be made to suffer by overcarefulness, for a time, as for example it was with water gas, whose promoters could not land anywhere until they were fairly driven into

1. Perhaps it is not so generally known among gas men that the principle of the compound engine is not at all a new thing, save in the instance of successful application; for within as recent a date as 1865, an engineer who would have proposed what is now regarded as good practice—running the steam from one cylinder into two, or even three additional cylinders, before discharging—would not have been able to pass any examining board.

organizing opposition companies. But at last, unreasonable arguments, obstinate resistance, and what now looks much like wilful blindness, had to give way to stubborn facts, and to day the pioneers of the water gas industry may be proud of their great achievement. But they were bound to succeed; for is it not written, "Great is the Truth; and it shall prevail?"

To-day, although coal gas may be undeniably the cheapest in certain localities, yet the wise manager, if he be able and his company can afford it, will not rest until his works are provided with a first-class water gas plant, for possible emergencies, if for nothing else. In illustration of this statement the following anecdote seems to fit nicely: Said an eminent Scotch gas engineer to me, not so very long ago: "Do you know why a water gas apparatus is like a good wife?" Upon confessing my inability to see the analogy, he continued: "Because it is a good thing to have handy around the house." This conundrum may not be a good joke, but it sizes up the situation fairly well.

The inclined retort system, as improved after careful study and long practice since its first introduction, is now so largely used, and its results so well attested to be exceedingly favorable, that conservatism in the matter may cease to be a virtue soon; and that statement of the case applies with equal force to the cautious executive of the company who expects its business to be conducted in the most profitable channels.

"Let well enough alone" is a good motto, when coupled with sound judgment as to time and occasion; but "Excelsior" should be, and is, what the progressive gas man prefers. To let well enough alone has been a real hindrance to the adoption of the inclined retort system in more than one place, where 50 per cent. in the operating expenses might have been saved for years, had better judgment prevailed. A close second to the "Let well enough alone" party is the fortunately not numerous sort "Who know it all:" And these two are amongst the most obstinate opposers to any advance in any business, unless it originates with them; which does happen sometimes. Of course it is well understood that the people who attend the meetings of Associations such as ours, or who contribute to their support and encouragements, or have done their full share to this in the past, cannot be included with these obstructionists to progress; but as they do exist, and have been met in connection with the subject of this paper, they should be mentioned. The earlier failures of the Coze system, of which mention has been made, are a serious and rational reason for the hesitation of some gas managers to recommend the adoption of the inclines. These are made much of by persons whose interest lies in other directions, and *that* condition should be weighed by the gas man who, not having read up on the subject, asks for information from those whom he supposes can give it. I submit whether it is not a fair proposition that one who perhaps is financially interested in a first-class mechanical stoking machine, or who may truly or erroneously fancy that the thing he is most interested in will be interfered with, or he who has no other interest than to sell something anyhow, is capable of giving an unbiased opinion concerning the inclined retort system. Such a person may be, and I willingly concede most likely is, all that an honest man and a gentleman should be, but I submit is it not in the nature of things that such a one will hardly be able to free his mind sufficiently from a natural prejudice to enable him to give (not an honest. for though adverse it may be strictly honest), an opinion which can be safely relied upon by the gas manager to guide him in the selection of any system for the manufacture of gas. I am speaking to gas engineers and superintendents as a gas engineer, and from the gas company's standpoint; but I have not the remotest desire or intention to give offence to anybody present in making this plain statement of facts as I see them.

About nine years ago I first engaged in the evolution of the inclined retort system, if I may be pardoned the expression, as a labor of love, and I can, therefore, speak upon the subject with some authority, obtained through study and actual experience; but as within the past year I have been obliged to make a business of my researches in that direction I do not presume to ask you to take for granted what I have said and written about the inclined retort. The evidence in favor of the system of letting nature do a large part of the heavy work now done by hand or expensive machinery is so plentiful and easily obtainable that, it seems to me, any manager is now warranted without further hesitation to buy the pudding and get the proof. It has been urged that the manufacturers of the apparatus are justly chargeable with hindering the free adoption of the inclined retort; therefore, let me give you some examples of the kind of propositions to erect inclines which have come to my notice only this year, and we are but in the middle of May. The manager of a certain gas company assured me he was personally satisfied that the inclined retort was good; perhaps the best method for making coal gas. His company was about to erect a new works and would be pleased to have an offer to erect a new retort house with inclined retort benches, and a total capacity of 1,000,000 cubic feet per diem. But his company would not consider any proposition to erect inclines, excepting together with the following conditions: The contractor for the retort house to erect and run the benches for two years; if satisfactory to the gas company, at the end of that time, the benches to be paid for; if not satisfactory to the gas company the contractor to remove the benches at his own expense. But the company generously would be willing to pay for such of the fireclay material as could then still be used by them. If there is any contractor insane enough to take up such proposition, he can probably get plenty of business by letting the fact be known. Everybody versed in retort house practice knows that any retort bench, no matter how good the material and workmanship may be, can be greatly injured, perhaps ruined, by one night's careless work, especially where the powerful regenerative furnace is used. What if the wilfully guilty, or perhaps only slothful, person is sure to be found out the next morning? Is it at all fair to expect a contractor to give a general guarantee and to take such risks as that? Gas companies that make coal gas assume such risks everyday of working, and nothing is thought thereof, but the gas company controls the men and its officers—it has known them perhaps for years; but can any contractor afford to take such risks? What is the contractor to the men, or they to him, save that he is putting up something which, like every new improvement, the men do not like; and if they know the company will not be the loser through the destruction of the improvement, it is a foregone conclusion that it will be destroyed. This matter of guaranteeing a method now working satisfactorily in dozens of works abroad, and which certainly can be expected to do the same here, if operated with like care, is one of the hindrances to the adoption of the inclines in America. From the preceding lines it can be seen that it is hardly fair, and not to be expected, that a contractor should take all the risk; and such, too, as he is never asked to take with horizontal retorts. On the other hand, I have not yet heard of any gas company which, despite the great saving that the successful operation of this system would bring it, that would take *any* risk whatever. It is all very well for gentlemen who have been in Europe, having seen the inclines work charmingly, as I, too, have seen them, to say, "This thing ought to be pushed; why don't you push the thing?" Pardon me for re-quoting from the address of the Chairman of the Society of Scotch Gas Managers, Mr. Hubert Pooley, of Dunfermline, at the 15th annual informal meeting, held at Glasgow, Scotland, April 6th, this year, the following: "I had an experience of M. Coze's first system of 'slopers' when I was serving my articles, but since those days very great improvements have been introduced, and I think I am correct in stating that to-day, for economy of production, they stand unrivalled." That statement of Mr. Pooley's is not the strongest, or only one given relating to the system; but it is the latest that has come to my knowledge. One must wonder why such a system should require *pushing* in this country where "dollars" rank above everything else in creation, with many, though not all, thank God. But as you now have been informed of a number of the hindrances to the adoption of the inclined retort system in America, I will close with the hope that the time may be near when these shall be removed, and when those who desire to make coal gas and coke, and want the best all around method to do this, will get better acquainted with this system, which is theirs to command.

Discussion.

The Chairman—The very interesting paper by Mr. Egner is before you for discussion.

Mr. Tayler—Mr. Egner, what is the economy in labor in the practical running of inclined retorts as compared with the ordinary method?

Mr. Egner—It is fully one half.

Mr. Jenkins—How do you figure that out? Do you figure on all the labor between the coal shed and the coke pile, or only the labor in the retort house?

Mr. Egner—Of course in comparing this system with any other retort house method, the bringing in of the coal with the taking away of the coke does not figure at all; because one man may have a good system to bring in the coal and remove the coke, while another man may have one which is not so good. This saving is effected in the charging and discharging of the retorts. If you have a good system of bringing in the coal and taking away the coke, that of course adds to the general efficiency of any plant.

Mr. Littlehales—I would like to ask Mr. Egner whether that saving

of one half in labor would include the extra outlay for that system; whether after charging the interest on the cost of the extra outlay there would still be a saving of 50 per cent.?

Mr. Egner—I would answer Mr. Littlehales in this way, while I cannot tell you what contractors would charge for the benches (I have not been able to find that out myself) I know what they ought to cost, for I have built them. Then as to what the owners of the patents may ask for rights I do not know. But you may look at it in this way. An inclined bench will cost no more to build than the horizontal bench of like producing capacity, and as a matter of fact, taking the producing capacity as the gauge or criterion, the inclined retort bench should cost, and I have been assured by European engineers that it does cost, less. Consequently there would be no additional outlay whatever.

Mr. Murdock—Can Mr. Egner tell us what is the per cent. gained in gas per pound of coal by the quick charging of retorts?

Mr. Egner—Engineers using the system tell me that the yield of gas per pound of coal is about the same. The yield of coke is a little better, because there is less breeze made in drawing the charge. While perhaps that gain is not much, it is nevertheless true that the coke yield is a trifle better, the quantity and quality of the gas being about the same.

Dr. Moss—I might say that from practical experience, first, with respect to the coke, the purchasers in every case prefer coke from the inclined retort rather than from the horizontal; there is less breeze made, so it is cleaner, and it was considered much better than coke from horizontal retorts. While I do not consider that a very important point, it may have some bearing. In England there is no doubt in the world that inclined retorts are a success, and that the leading gas engineers there prefer the present plan of inclined retorts to the horizontal ones. Referring to what Mr. Egner has said respecting guarantees, I know from experience that we did have some trouble in first starting up the inclined retorts because the men did not care very much for the change, and for that reason the retorts lost to some extent their efficiency; but after a short time they preferred being sent up to the inclined retorts than to charge the horizontal. The yield of gas per pound of coal on the inclined system, in the place I have reference to, was greater than in the horizontal system. The charges were shorter, and the producing capacity was very much greater, and in a number of places, instead of enlarging the retort house to meet an increased demand for gas, the same retort house could be utilized and the producing capacity increased to a considerable extent.

Mr. Egner—When I wrote this paper I did it with considerable hesitation. I have said and written so much about the inclined retort system that I was very much afraid that by and by you would get tired of hearing about the subject; but it is such a great improvement, and it seems to have been taken such little hold of in this country, that I thought the matter should be brought up once more. I assure you, however, this is the last time I will ever bring it up. I only want to call the attention of members to a few additional features connected with the subject. The thought was suggested to me by what Dr. Moss has said. In a certain city, for instance, I saw a retort house standing in the yard, that had one double stack of benches in it. The building was high enough for inclines. Two stacks of inclines could be placed in it, and in such a way that, by discharging the coke directly into the yard, the retort house capacity could have been doubled there without any material additional expense for building, by putting in inclined retorts. When you speak of the cost of a bench of inclined retorts, you should consider the length of retort you may want to use. You may decide to put in a bench with retorts 20 feet long, that would be equal to two benches of 10 feet retorts back to back, and naturally would cost more than one such a bench of the latter class would cost. I have seen inclined retort benches only 9 feet 6 inches long, but I would not think of or recommend putting in an inclined bench like that. It would be a pity to build an inclined retort bench as short as that, because you can charge a retort bench 20 feet long just as easily, or with the same amount of labor, as one which is shorter; and if you take the short bench it will reduce the economical results proportionately when using the inclined retorts.

The Chairman—It is to be hoped that Mr. Egner will feel inclined to present the subject again.

Mr. McIlhenny—What is the smallest number of benches Mr. Egner supposes could be operated economically under the inclined system?

Mr. Egner—I will reply to Mr. McIlhenny with an illustration. For instance, if I had a gas works in which we were making water gas only, using anthracite coal or coke in the generators, even if the works were quite small, I would put a bench—if but with one inclined retort—alongside of that generator, and large enough to make all the coke required in the generator. The gas makers would have time enough to attend to the work between runs. From this you see I think the inclined retort system is quite practical to use in any small works, and by taking advantage of the force of gravity, which costs nothing, save money. Of course, you have to raise the coal; but anybody who can shovel coal can bring it up to the required height in a wheelbarrow, and dump it into the charging end of the inclined retort. You are not obliged to have the coal hoisted or broken by machinery. As I said, in small works you may dump the coal from a wheelbarrow into the retort, and then you have the force of gravity to distribute it; when it is coke, and you open the lid, gravity will take it out for you. Any good, strong boy can do the work, if men are scarce.

Mr. Forstall—Am I right in understanding Mr. Egner to say it would be practicable to charge inclined retorts by running the coal up on a wheelbarrow and dumping it into them. Would we get equal charging that way?

Mr. Egner—Yes; and I believe it could be done very nicely.

On motion of Mr. McIlhenny, the thanks of the Association were voted to Mr. Egner for his paper.

The President now called upon Mr. E. H. Jenkins, of Buffalo, N.Y., who as Editor of the

WRINKLE DEPARTMENT,

presented the following budget:

Method of Protecting Clay Retorts while being Handled.—The following method of protecting the mouth of clay retorts when being handled is forwarded by Mr. Bryce McAdam, of Michigan City, Ind., and will no doubt be found valuable by retort manufacturers as well as users. It is shown on Plate 1.

The mat is made of four pieces of 1-inch manilla rope, length to be about one half the outside diameter of retort; splice an eye on the ends of each piece large enough to admit a ½ inch bolt; they are then sewed together with good twine, eyes in line at both ends, with a space of 1½ inches left between two center eyes at each end to admit band. Have a band made (Figs. 1 and 2) of $\frac{1}{16}$ hoop iron, 1½ inches wide, turned over and riveted, forming an eye for ½-inch bolt at two ends. This eye fits between eye on rope ends, and a ½-inch bolt put through both, with good-sized iron washers on both ends of bolt, to prevent rope slipping off bolt. This hoop iron is brought to top of retort, where lugs of heavier iron are riveted on with ½ inch bolt holes in them, through which is put a ½-inch bolt; a large thumb screw is used instead of the common nut, and can be made sufficiently tight without the use of wrench. To prevent mat or band from slipping either way, a piece of iron, ½ inch thick and 1½ inches wide, is riveted on band on top and bent so as to fit in nut hole of retort (as shown on top of section *a. b.*, Fig. 3). The same is done on bottom in either one of the bottom holes, by bending the iron round the two last pieces of rope, and making it fast by putting a small bolt through both thicknesses of iron between the two last pieces of rope.

Stand-Pipe Reamer.—There are few coal gas companies that do not have an occasional stopped stand-pipe, and the device shown on Plate 2 is one of the best forms in use for cleaning out such obstruction. This design of stand-pipe reamer is furnished us by Mr. F. C. Shepard, of Minneapolis, Minn., and the sketch is almost self-explanatory. Fig. 4 shows steel plate as fastened to handle before being rolled into shape as shown in Fig. 5. Fig. 6 shows end view, showing shape of reamer when inserted in stand-pipe. One can readily see that there is just enough give or spring to an apparatus of this kind to insure good work, and the plate or blade is sharpened on lower side so as to readily cut its way through any obstruction. Fig. 8 shows shape of handle when reamer is used for bent stand-pipe.

Water Overflow.—Plate 3 shows an arrangement of a water overflow that can be applied to any piece of apparatus in a gas works. This attachment is contributed by Mr. Howard C. Slater, of Milwaukee, Wis., and will no doubt be found quite valuable to many of us. The water pipe shown may be connected to the apparatus, the water overflowing under the glass receiver in full view of the operator, and out through the pipe connected with the sewer, marked "inlet to apparatus;" or it may be connected to the apparatus through such pipe, the water flowing out through the water pipe.

Spray for Scrubber.—Nearly all of us have had more or less difficulty in keeping a uniform spray of water in the scrubbers. Mr. Bryce McAdam, of Michigan City, Ind., offers an arrangement, as shown on Fig. 12, Plate 4, which it is claimed acts perfectly, and does not allow the small holes to become stopped up from sediment. In the top sheet

of scrubber a ¼-inch nipple is screwed in, which has 1 inch of thread inside and the same outside of sheet, a piece of ¼-inch round, rod iron has an eye made on it to slip up on nipple, and bent so as to have both arms 2½ inches apart. It is then cut 8½ inches long from one shoulder of eye to each end; ½-inch of the ends is flattened out and bent at almost right angles, and on this is riveted a small, round plate, 2½ inches in diameter, made of No. 22 sheet iron, perforated with a few $\frac{1}{32}$ of an inch holes. A ¼-inch coupling is screwed on nipple, holding on spreader, and on lower end of coupling is screwed a piece of ¼ inch pipe, drawn to a point at lower end, leaving a small hole, which should be reamed out true, to the desired size (in my case the hole is $\frac{3}{16}$ of an inch). This point is 1½ inches from the plate, which plate should be a little concave. The action of the water coming in contact with this plate makes a perfect spreader for a scrubber. On the upper end of ¼ nipple is screwed a ¼ T for water supply, with a plug on top, so that in event of a stoppage the water can be shut off at valve, the plug taken out and a wire inserted down through the point.

Novel Method for Removing Obstruction in a Sewer.—Mr. O. O. Thwing, of St. Louis, sends us a description of this scheme.

The following "Wrinkle" will probably not often be applied, but when required will be found useful. It is also interesting, as showing that a good gas works foreman is seldom at the end of his resources. Last summer an 8 by 10-inch box sewer, about 200 feet long, leading from the gas works to the river, became stopped up and all efforts to open it by steaming, sounding or flushing were fruitless. As the sewer is from 10 to 15 feet under ground, the idea of digging down to it was not relished. When we had about concluded, however, that there was no other remedy, a brilliant idea struck Tom Maguire, our yard foreman.

There were any number of big, lusty rats, living rent free in various parts of the works. He put them to work. Traps were set that night, and the next morning Maguire had three able-bodied rats which he introduced into the mouth of the sewer, closing it with a wire screen. From day to day one or two others were put to work each morning as they applied to Tom's trap for a job. For about four days there was no result. Then a small stream of slime and ooze appeared at the mouth of the sewer. The next day we had a fair stream of water going through, and in two days it was cleared. None of the rats reported at the office for their time, although we would cheerfully have entered them on our pay roll.

Plan for Blanking Off Large Flanged Valves.—When it becomes necessary to remove the bonnet and gate from the valve at any point in in a gas works system, it has generally to be done under a considerable pressure. When the valve is 10 inches or over, it is necessary to shut off the gas from the valve during the operation. This is usually done by blanking off, or placing a blank flange of light sheet iron between the flanges of the valve and its connections. In blanking off we have frequently had trouble in separating the flanges with wedges far enough apart to permit the blank flanges to be inserted.

After having an experience in repairing a valve in our valve house, at which time we were obliged to dig a hole, 15 feet deep and 10 feet square outside the house, in order to give room for the pipe to shift sufficiently for the insertion of a blank flange, we adopted the following rule: In connecting up all valves at the works we have a ring, or "Dutchman," of No. 16 iron, made for each flange, corresponding throughout with the face of the flange, except at one point, where it extends 2 or 3 inches beyond the outside of the flange. This projection has a hole in it to permit of the ring being withdrawn with a hook or bar when required. When it is necessary to blank off the valve the bolts are taken out, the ring withdrawn and the blank flange slipped into its place and clamped fast. By this means we are able to blank off a valve without the use of chisels and wedges to force flanges apart, with the possibility of breaking them.

The above "Wrinkle" was contributed by Mr. O. O. Thwing, of St. Louis, Mo.

Electric Tell-Tale for Station Meter.—Fig. 13, Plate 4, shows an arrangement, used by Mr. James Ferrier, of Columbus, Ga., as a tell-tale for station meter, and is constructed as follows:

1. Fix two binding screws in the dial plate of the meter, at the positions marked *A* and *B* in the sketch. Insulate the wires from the binding screws and place them so that the hands of the meter will be in contact with them when at the *O* mark. The circuit will thus be closed only when *both* hands are at the *O*.

2. Get an obliging friend connected with a telegraph or railroad company to give you an old telegraph sounder. Strip it of all unnecessary parts, attach to it a pencil, as shown in the sketch, and fasten it to a strap of wood placed across the door of the recording pressure guage. A single cell and the necessary wire to connect with the meter will complete the outfit.

It is evident that, according to the dial at which the binding screw *A* is placed, the pencil will tap the paper at the completion of each 100, 1,000, or 10,000, as may be desired. The advantage of placing the binding screw *B* at the fastest running of the meter is that it insures the closing of the circuit only momentarily, and thus avoids rapid exhaustion of the cell.

Electric Station Meter Index.—Contributed by Mr. F. H. Shelton.—This is not an accomplished "Wrinkle," it is a suggestion. I read, I think in a paper by Mr. Geo. Treadway Thompson, that in France he observed some station meters upon which the dials that we are accustomed to were not used, but an arrangement of sliding plates, by which, at any one time only the figure on each dial was visible that should be read. This seems to me to be a good idea, as we know that in a hasty reading of a meter it is easy to make a mistake and read some other than the right one of all the visible figures. While it would be expensive to alter an existing dial gear to this French plan, it yet seems to me that a superintendent who, in addition to the meter index proper, might want to observe in his office at a glance the station meter readings, might rig up an apparatus that would correctly show only the figure last passed on each dial of the meter, and which would be operated electrically by the existing meter hands.

Could not a slender, stationary ring, carrying ten contact points, be so arranged in front of each dial that as the meter hand passed a figure it would make a contact or close a circuit, causing a shutter to drop in an index board, in the same way that the floor numbers appear in an elevator indicator call box or in a hotel room call when a button is pushed and the circuit closed? If a meter had, say, seven dials, and if seven such electric boxes of vertical pattern, ten calls each, were constructed side by side in one frame and so connected, and the contacts so adjusted that the last figure would not disappear until just as the next was due and operated upon, a glance at such a frame would show, at any time, where every hand stood in the meter house. While it would take some little carefulness of adjustment and exactness of arrangement in the installation, yet, after once being rigged up it seems to me that this application of a hotel electric room-call box would be dependable and easily kept in order, and that it would be a very convenient arrangement. It could be checked once a day by reading the meter index itself, and would save going back and forth in the interim, as well a chance of errors, by enabling the recording clerk of the works to enter the figures without the intervention of another man having to take and report them.

A Method of Removing Naphthaline from Inlet Pipe to Gasholder.—Mr. James Ferrier, of Columbus, Ga., presents the device as shown on Plate 4, and describes the same as follows:

In spite of all our precautions naphthaline will sometimes accumulate in the holder inlet. A contrivance which gave speedy relief is shown in the sketch Fig. 14, Plate 4, which is probably self explanatory. It consists mainly of a piece of 2-inch pipe, from 3 to 5 feet long, through which passes a ¼ inch pipe, secured at the ends with bushings and lock nuts. The ¼ inch pipe conveys steam to the inlet drip. Benzole is trapped into one end of the 2-inch pipe, is converted into vapor by the heat of the steam, and in that state is sent into the inlet main. The steam serves more than one purpose. It vaporizes the benzole and prevents condensation of the vapor until it reaches the napthaline. It also prevents the naphthaline from *freezing* in the drip, which to my decided inconvenience, I found was a probable occurrence. A small quantity of steam will be found sufficient. The steam should be shut off at the stop cock, and the drip pumped at intervals.

Automatic Indicator for Showing Height of Holder.—Contributed by Mr. F. H. Shelton.—Essentially the following device, Fig. 15, Plate 5, was observed in Palatka, Fla., in the office of Mr. C. J. Hayes, superintendent of the Gas Company. It is one of the many rigs used for conveniently showing the amount of gas in a holder, under the nose of a superintendent, in his office. It is compact and simple, and can be made by any handy man.

A large, old fashioned auger is carried horizontally in a frame *A* attached to the wall, and so mounted that in revolving it cannot move endways.

On the shank a wooden drum wheel *B* is attached. On the auger proper is loosely fitted a nut *C* carrying a pointer, and working between two guides, that, while permitting it to easily slide sideways between them, will not let it turn over or revolve. A cord, fastened to and leading from the holder, over suitable pulleys, is carried down

the wall, and one or more turns made with it around the drum. On the end of the cord a weight is attached to keep it taught. It will be seen that, as the holder rises and and falls, the cord, pulling on the drum, will make it and the auger revolve, which in turn will make the nut on the auger travel sideways. The pointer on the nut will then indicate, on a suitable scale attached behind it, the varying holder height. The spacings and markings on the scale can only be determined after laying out the rig, in which matter the rise and fall of the holder, the diameter of the drum wheel, and the length of the auger will all have to be figured and properly proportioned. If the rig is on the second floor, the weight on the cord may have room to rise and fall, hanging in the room below. If it is on the first floor it may be provided with extra pulleys *D* as shown, or compound pulleys *E* to shorten its travel, so that while 20 feet of cord may be paid out for instance, it would move vertically but five feet. The special auger nut may be easily made by casting a square chunk of lead in a mold, in which mold the auger is placed, first having coated it with something to prevent the lead adhering.

Neat forms of indicators of the plain sliding weight and scale board type are shown in No. 3 of the "Wrinkle Department" at one time conducted by the Progressive Age, issue of Feb. 16, 1891, and a home-made apparatus for *registering* the height of a holder throughout the 24 hours (in the same way that a gas pressure register records on a sheet of paper), may be found in "Wrinkle" No. 7, same series, issue May 15, 1891.

A Drain for Gasholder Cup.—Fig. 17, Plate 5, shows a contrivance to drain surplus water from the holder cup, and to prevent the water from flowing on the outside of holder and freezing. This arrangement is furnished by Mr. Donald McDonald, of Louisville, Ky., and is described as follows:

A is water level which we wish to maintain; *B* the corresponding level in the other leg of the cup; *C* a hole tapped through the outer sheet of the holder and plugged with a ¼ inch plug; *D* a hole made in the cup by the same drill and not plugged. All surplus water runs through the hole (*D*) into the pit, and the water level in the cup remains constant.

Overflow for Steel Gasholder Tank.—Mr. McDonald also furnishes a sketch for an overflow for holder tank, shown in Fig. 16, Plate 5, which he describes as follows:

The overflow from our holder tank gave some trouble. It is a steel tank, above ground. The water would fill up to the overflow and then run out very slowly, keeping things wet and sometimes freezing. Two street ells, arranged as shown in the sketch, form a siphon which starts itself when the water gets up to the line (*A B*) and stops when it gets down to the line (*C D*). No trash floats into this overflow pipe.

How to Examine the Inside of a Gasholder while in Operation.—The following arrangement for accomplishing the above results is contributed by Mr. B. E. Chollar, of St. Louis, which he describes as follows:

It is a desirable thing to be able to examine the inside cup roller of telescope gasholders. All that is necessary for the accomplishment of this purpose is a small, 8 volt lamp that will pass through a ¾-inch bolt hole, some double lamp cord, and a 4-cell, storage battery. If there are grip rollers immediately over the cup carriages, take two bolts out of a carriage, put the lamp down through one of the bolt holes, and look through the other. A hat full of cotton waste will stop the gas from the lamp hole, and a piece of glass and an indiarubber washer form the sight hole. In case there are no carriages on top of the grip, holes will have to be drilled for the lamp and for observation. By these simple means the inside rollers and brackets can be examined at leasure.

An Arrangement to Prevent Gas Escaping while Laying Service Pipes.—Mr. W. P. Elliot, of Chicopee, Mass., sends the "Wrinkle" shown on Fig. 18, Plate 6, and describes it as follows:

A is intended to represent a gas main of any size, *B* a rise pipe for service, *C* an ordinary tee, *D* a plug turned out of any good, hard wood, *F G* house supply pipe, *H* the connection. The method of operation employed is first, tapping the main with the ordinary pipe tap corresponding in size to the size of service to be connected. Having the tap well soaked in the beginning of the operation, as soon as the hole is tapped I remove the machine, allowing the tap to remain in the hole to serve temporarily as a plug. It also serves to indicate the pitch and enables us to obtain an accurate measure of the rise pipe *B*. Remove the burr from the inside of the rise pipe, screw up the tee until it is tight, then insert wood plug *D*. This plug should be made of sufficient length to allow a taper, which will insure a tight fit in end of rise pipe *B*. Now, having the tee and rise pipe in readiness, remove the tap, screw in the rise pipe, and proceed with the house connection in any manner desired. After the pipes are all connected, and all openings inside of the building properly closed, remove the wooden plug *D* and insert an ordinary iron plug *I*. I have shown the connection as being made with the union *H*, although I prefer an ordinary lock-nut nipple. By this method an ordinary workman will connect a service with no appreciable loss of gas and without danger from gas escaping while the connection is actually being made; in fact, I prefer this matter, even in cases where an entire new service is run through a trench into a building, although where we encounter fine lawns, cement walks, etc., it is my practice to drive the pipes in sections of suitable length from the building to the curved line where curb stop is set (if any is to be used), thence through a trench to the main.

Tank for Heating Alcohol or Naphtha.—This tank was designed for the purpose of obtaining a simple and safe method for heating alcohol or naphtha for main and service work. A galvanized iron tank *a*, Fig. 19, Plate 6, is properly supported inside of a second galvanized tank *b*, leaving an annular space *c* between the two tanks. *E* is a screw capped oiling pipe for tank *a*; *f* a filling pipe for tank *b*; *m* a discharge pipe and cock for tank *a*; *n* the same for tank *b*. Tank *b* is entirely covered with wood lagging *d*. To use the tank, fill tank *b* with boiling hot water through *f*, first closing cock *n*. Close cock *m* and pour into tank *a* the alcohol or naphtha to be heated and screw cap on pipe *e*. Tank *a* being entirely surrounded by hot water, its contents are quickly heated. Pipe *m* is now connected with main or service by means of a hose, the cock opened and the liquor allowed to run out. If it is desirable to use vapor in place of liquor, the connection should be made with pipe *e*. The water will keep hot for several hours, so the tank may practically be taken anywhere and used.

The above arrangement is sent us by Mr. Carl H. Graf, of Lawrence, Mass.

Convenient Aids in Proving Meters.—We are indebted to Mr. Geo. F. Summers, of Hackensack, N. J., for the items illustrated on Plate 7, which are valuable for the convenient testing of meters.

Fig. 22 represents a bell arranged to ring a few seconds before a reading is required, relieving the operator's mind from the responsibility of watching the meter while a test is being made. The device is made from a tin disk, which came with a new meter, and some brass wire.

Fig. 23 is an index scale to give an easy and accurate means of ascertaining the height of the prover. This is made from part of the silvered brass scale cut from a thermometer.

Fig. 20. Two thermometers are used to determine the temperatures of the gas (or air) in the prover and that in the meter The thermometers in this case are ordinary 12 cent thermometers with the case removed and the lower half of the scale cut away. The meter instrument is fixed permanently into a meter union with cork and paraffine, a hole being drilled for the proper flow of gas. The prover instrument is suspended in the gas being measured, through a hole cut in the prover top. A brass pillar cut down and soldered to the top makes a convenient opening for the cork and paraffine. I consider for a commercial test, a maximum difference of 1° (¼ of 1 per cent.) to be close enough.

Fig. 21. For the heating of the water in the prover tank a steam pipe is brought up through the floor and over the edge of the tank, suitable connection being made to draw off any surplus of water from the bottom of the tank. The water should be heated a few degrees higher than the air in the room to allow for the cooling due to evaporation. One-eighth pipe is used to prevent the jar due to the condensation of the steam, and the pipe is bent to produce a rotary motion and consequent agitation of the water in the prover tank. An old lamp post cock makes a convenient steam valve.

Gas Shut-Off Rig for Show Windows.—Contributed by Mr. F. H. Shelton.—Gas companies can occasionally catch a merchant who likes to make an evening display in his show window, by offering a rig that will automatically shut off the gas at any desired hour, thus saving waste of gas through the night. The following contrivance for such purpose (see Fig. 24, Plate 7), was observed at Baltimore, Md., the arrangement of Mr. George F. Meyers:

An ordinary 90 cent alarm clock has on the back a large winding key *A* for the clock proper, and a small key *B* for winding up the alarm. This key upon winding can be left in a horizontal position. In such a case a button hook or stiff wire, supporting a small weight *E*, with one end bent at right angles, can be caught on one end of the key. In Baltimore such a clock is so rigged in the window, and the weight is attached to the lever of a gas shut-off cock *F* by 6 inches of chain;

PLATE 3

Fig 9

Fig 10

Fig 11.

PLATE 2.

Sketch of Standpipe-Reamer as used by Minneapolis Gas Light Co

Fig 4

Fig 6

Fig 7

Fig 8

Fig 5

Plate 1.

Fig 1. END VIEW

Retort

1" Manilla Rope

Fig 2. Retort

PLAN.

Section A-B

Fig 3 Retort

PLATE 4.

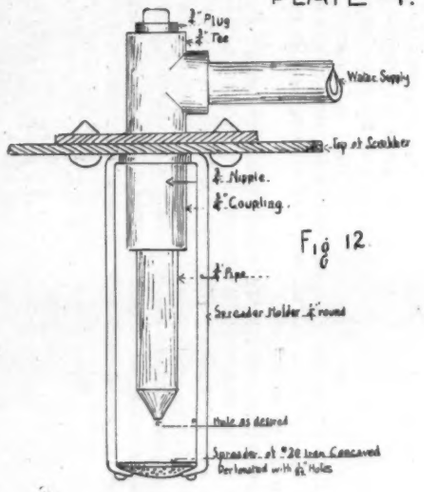
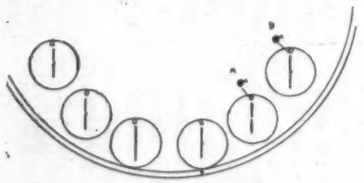
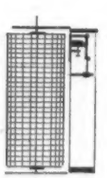


Fig 12



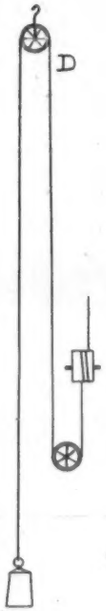
Face of meter

Fig 13



Pressure Gauge

PLATE 5.



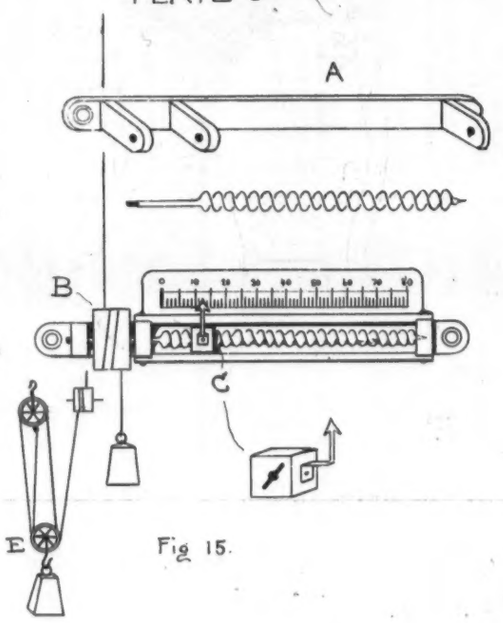


Fig 15.

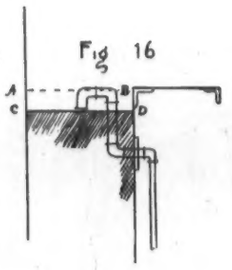


Fig 16

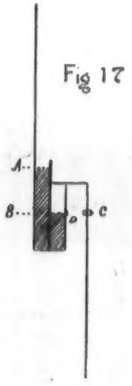


Fig 17

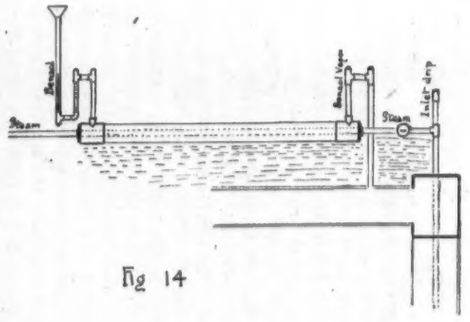


Fig 14

PLATE 6.

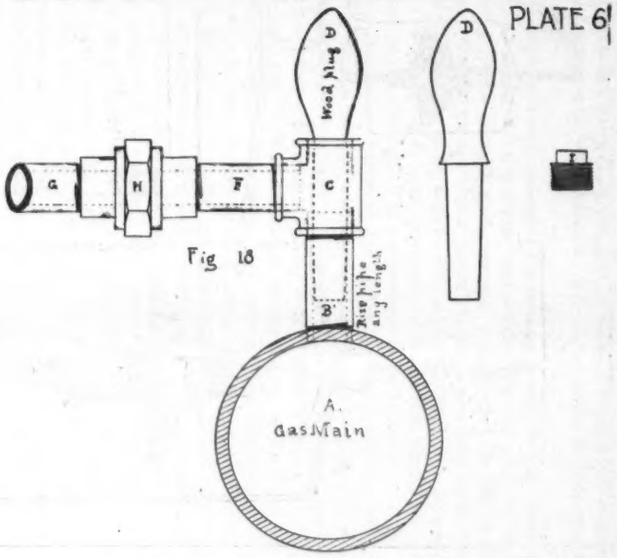
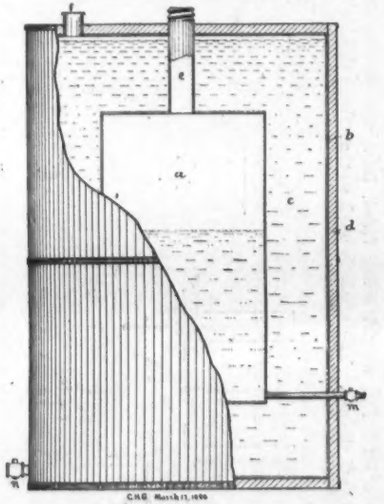


Fig 18

Fig 19

TANK FOR HEATING ALCOHOL OR NAPTHA



only the clock is visible. The cock and lever are beneath the window flooring. The clock and the alarm are wound up and the latter set in the usual manner. When the alarm goes off, say at 11 P. M., the winding key *B* revolves backward as the spring unwinds, and spills the hook off. The weight being freed, falls and throws the cock, shutting off the gas. The chain is used so that the weight will have

PLATE 7.

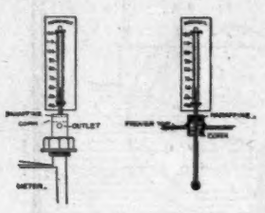


FIG. 20.

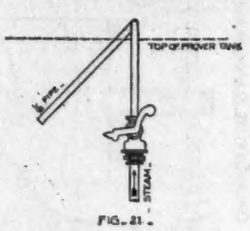


FIG. 21.

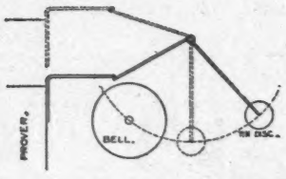


FIG. 22.

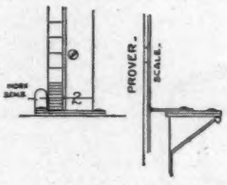


FIG. 23.

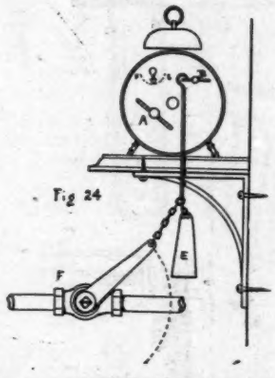


Fig 24.

enough momentum, from falling a few inches, to throw the cock, even if it should stick a little. The weight will tilt the clock over when hanging on the winding key, unless the clock is wired or otherwise fastened to the floor or bracket that it rests upon. The rig is simple, safe, sure and very cheap.

Anti-Vibration Fixture for Welsbach Lights.—Contributed by Mr. F. H. Shelton.—Gas companies selling cheap light, in connection with Welsbach burners, are at times called upon to so arrange the lights that in places subject to vibration and jar the mantle breakage will not be excessive. The following device is simple, cheap and effective—Plate 8:

A rectangular loop *A* is made 11 inches wide by 16 inches high, by bending $\frac{5}{16}$-inch iron or brass wire as preferred, to the form shown in sketch Fig. 25. An eye *B* is formed at the top and two ends are brazed (not soft soldered) into opposite sides of a $\frac{1}{4}$-inch cross *C*, brass or iron as preferred. In the other outlets of the cross $\frac{1}{4}$-inch nipples are inserted. The light is mounted on the upper nipple, and a rubber hose connection *D* is made from the under one to the nearest gas cock. The whole is suspended by an ordinary 5 cent canary cage spring *E* from the ceiling or the other support, according to the circumstances Any jar, either in the gas pipe or the ceiling, is absorbed by the rubber or the spring and affects the light but little. The shut-off cock should be so located as to keep gas out of the hose when the light is not in use. This rig is especially applicable to lights over desks (Fig. 26) where the feed is, say, a $\frac{1}{2}$-inch riser coming up through or behind the desk and is often hit by books or people. Extending such a riser gives a sufficient support for the loop.

PLATE 8

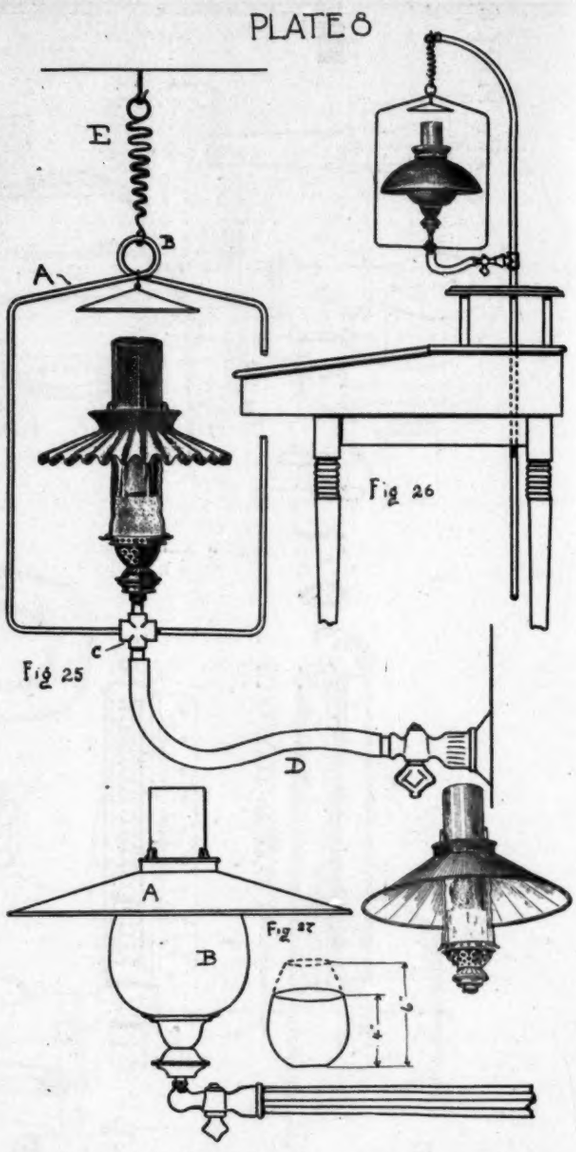


Fig 26.

Fig 25.

Fig 27.

Billiard Table Light.—Contributed by Mr. F. H. Shelton.—Gas companies are frequently asked to supply a better and a cheaper light for billiard tables than electricity or the ordinary flat flame gas burner, shooting out horizontally. The following adaptation of Welsbach lights, which has been extensively used and is very satisfactory, is illustrated on Plate 8, Fig. 27.

The standard number 34 burner is equipped with a mirror or silvered glass reflector *A*, and an 1,101 (or opal 931) globe *B*, cut down to 4 inches in height. The reflector throws the light down where it is wanted. The opal globe softens the light and entirely screens the mantle from the player's eyes. The strong, steady light of the Welsbach burner is thus well utilized, and although on the eye level, it is not trying to the player.

On 4 arm fixture, No. 312 reflectors should be used. On 2 arm, No. 311. No. 10 china dome shades will do quite well and are cheap, but have the objection of being easily broken, if struck by the player's cue. The globes can be cut down from the ordinary 6-inch height by a local glass cutter, or can be procured from the Welsbach Company.

The combination is neat in effect, and costs less than many less efficient large "billiard table reflectors" often used.

Hot Water from House Furnace.—Mr. Carl H. Graf, Lawrence, Mass., sends the following:

The chief objection to the sole use of a gas range in the kitchen is the absence of a constant supply of hot water. This can, of course, be remedied by the addition of a hot water heater, and while this may be satisfactory in the summer, there are few among our consumers who are able or willing to bear the expense of a hot water supply by this

means during the winter. With this in view, I made some experiments on heating water by means of a coil placed in the house furnace in the cellar.

Various sized coils were placed in the furnace, near the flue connection, with a view to utilizing waste heat and, while this plan worked satisfactorily for a time, it soon became evident that its efficiency rapidly deteriorated on account of the coil becoming covered with soot and dust. The next plan was to run a pipe through the furnace directly over the fire pot, with the result of a constant supply of hot water, both day and night. The connections are as follows:

The pipe from the bottom of the boiler is carried into the cellar, passed through the furnace, then carried back to the kitchen and connected to the inlet of our gas hot water heater, the outlet of the hot water heater being connected to the top of the boiler in the usual way. Thus all the water circulates through our gas heater, and with this arrangement you can heat water by gas in case of an unusual draw, and again all will be ready for the summer when the furnace is let down.

In this connection I would call attention to the great advantage gained in lagging the kitchen boiler, either with wood or steam pipe covering. Thus insulated, water will keep hot for many hours. A 25-gallon copper boiler, covered with wood lagging, was filled with water at a temperature of 61° F., and subsequently heated to 120° F. by means of a gas heater. The water was allowed to remain in the boiler 10 hours, and was then drawn off into the bathtub, when it was found to have an average temperature of 103° F.—a loss of only 24°. On first opening the faucet the temperature of the water was only 110° F., and after drawing off 25 gallons it still registered 93° F.

The cost of an installation like the above is small, and it can readily be seen what a gas company will gain if it can induce its consumers to use a gas range in winter as well as summer.

Plan to Overcome Fluctuations from Gas Engine.—Mr. C. J. R. Humphreys, of Lawrence, Mass., contributes the following idea on the above subject:

The scheme consists in checking gas supply to engine so that the gas bag is filling, as nearly as possible, the entire time between explosions, instead of all at once, as would be the case with a full opening. This adjustment should, of course, be made at minimum pressure and maximum load.

A Plan for Locating Leaks in Gas Pipes Under Streets Paved with Brick or Asphalt.—In the discussion which followed the reading of a paper on leakage at the Western meeting in Cincinnati, Ohio, last year, the question was asked if anyone had discovered a plan for locating leaks under streets paved with brick or asphalt. Mr. J. Frank Stacey, of Nashville, Tenn., contributes the following answer:

I adopted a plan some five years ago, whenever the city put down such pavements, to thoroughy overhaul all services and recaulk all joints. I also take ¾-inch pipe and place it half way under the main near a joint, and leave the end open and place some lose rocks around it, and then run the pipe to inside of curbing, and bring riser up level with sidewalk and put cap on riser. I put about four of these pipes to a block.

If at any time the smell of gas is detected, I simply take caps off, and where I find most gas escaping I remove the granite or asphalt at that point over the main. By this means I am enabled to determine from which direction the gas is coming. Should the leak be in a service, and there are several close together, in order to determine which one is leaking, I cut the service pipe in two at main, and shut off stopcocks in pavement and attach pump and gauge. This saves the expense of taking up unnecessary pavement, and proves if pipe is tight or not. In this city we are troubled very much with the destruction of our services by electrolysis.

A Novel Way of Extinguishing a Gas Fire.—On the evening of Nov. 22, 1897, an explosion of gas occurred at the corner of Niagara and Vermont streets, Buffalo, N. Y., which resulted in causing a heavy leak of gas from the 20-inch main on Niagara street, and the escaping gas becoming ignited, it is presumed from an electric spark in the conduit at that point, blazed to a height of some 20 feet or more, endangering surrounding property. For over two hours the fire department and others used every effort to extinguish its blaze, and the employees of the Gas Company dumped dirt in the conduit manhole, but without success. I quote as follows from the Buffalo *Courier-Record* of Nov. 23:

"After an unsuccessful effort had been made to put out the fire with dirt, it was thought to be practicable to fill up the manhole with water and thus drown it out. The water proposition seemed a good one for a few minutes, as the fire could not be seen. But it immediately broke out in another place, and the scheme of drowning it out was no good. Just then Manager H. H. Littell, of the Buffalo Railway Company, appeared on the scene. Seeing Mr. C. R. Huntly there, he approached and said:

'See here, Huntly, I'll bet you three bottles I can have that fire out inside of five minutes. Do you want to bet?'

"Mr. Huntley declined, but he said he would like to know the plan, and Mr. Littell replied that to throw two barrels of flour into the hole would completely extinguish the flame. Mr. Huntly and several other men laughed at such an idea, but Mr. Littell let them laugh, and sent away his wagon for the barrels of flour.

"The men thought he was fooling, but he proved to be far from it. He soon had the flour in small sacks, and ordered it thrown in the raging pit. One man after another threw bags of flour into the fire, until suddenly the hole turned black and a great puff of black smoke arose. That was the end of the fire, and with the end came a rousing cheer from the throats of the thousands of the people who were watching the spectacle. The flour receipt was suggested to Mr. Littell by a Fort Porter soldier."

[I wish on behalf of the Western Association and myself to heartily thank all those who have contributed, by their items and also suggestions, to make the Wrinkle Department so successful this year. They have proven that even though the field had been gone over very carefully in the past few years by our former Editor, and it seemed that there was little else to find, yet there are many valuable items hidden here and there, that to the one who knows them may seem scarcely worth publication, but which may help a fellow laborer at a very opportune time, if made public through the Wrinkle Department. There were a few items that came too late to be included in this year's edition, but they are too good to lose and will keep for the next.—Editor.]

Discussion.

Mr. D. McDonald—One of the most interesting Wrinkles in Editor Jenkins' collection is that which describes a method of removing obstructions in a sewer by the aid of rats. I would like to ask the writer if by "lusty rats" he does not mean musk rats. A musk rat will go through a sewer in the way described.

Mr. Thwing—I mean a common rat.

Mr. D. McDonald—It is a matter of fact that a musk rat will go through a sewer and clean it out, but I do not believe that a common rat will do so.

Mr. Doty—Referring to Mr. Elliott's Wrinkle, showing an arrangement to prevent gas escaping while laying service pipes, I desire to call attention to a fitting known as a street tee, which fitting, I believe, I originated at Paterson, N. J., in 1889. Progressive Age, issue of May 1, 1891, "Wrinkle 6," described the fitting and its use in connecting services. It is also shown in Brown's Directory for 1893, in the "Wrinkle Department." Recently I noticed, in the *Journal of Gas Lighting*, a patent fitting embodying the idea of the street tee with a screw stop valve in the vertical opening. Mention was also made of the use of a tee and nipple as of advantage in service connection by Mr. Fitzgerald at the last meeting of the Texas Association. I have here a specimen of the street tee fitting.

Mr. Doherty—Is that fitting on the market?

Mr. Doty—Yes.

Mr. Murdock—We get those fittings in Chicago.

The President—Is it a brass or iron fitting?

Mr. Doty—This was the first pattern made, and the present fitting, which is slightly different, is made of iron.

The President—If there is no further discussion, Mr. Jenkins says he thinks he is entitled to a vote of thanks, and if some one will make the motion I will entertain it.

Mr. T. D. Miller—There seem to be many devices for indicating the height of holders. I recently took the dial which came from an old 60-light meter, and calculated the diameter of a wheel on which to wind a cord attached to the holder, this wheel actuating the dial so as to indicate the contents of the holder. This wheel had to have two diameters, so that the cord running on it would accelerate or retard the movements of the dial, because it was attached to a 2-lift holder. As there seems to be a general interest in such devices, I will fix it up for the "Wrinkle Department" next year. It is very convenient.

On motion, a vote of thanks was tendered to Editor Jenkins, the ballot being a rising one.

The President introduced Mr. George Treadway Thompson, of New York, who read the following paper on

ISOLATED GENERATORS FOR BENCH FIRING.

The use of independent generators for firing retort benches, in place of a regenerator for each individual setting, is a subject toward which the interest of our engineers has been directed for several years. Few trials of the plan on a working basis have been made in our country, however, as the impression has prevailed that the system offered no material advantages for our conditions; this impression doubtless having arisen from the results with certain furnaces of the Siemens hearth type. Most of us have been content with the excellent results obtained by our recuperators, and our interest in the other plan has been directed to watching what is being done by others across the sea, rather than in any special original work at home. Exceptions are not lacking to prove the rule, but no installation has yet been made in the United States on much more than an experimental scale.

The suggested use of such independent generators in a large coal gas plant about to be constructed in a central Western city turned the writer's attention fresh to the matter, and some correspondence was had with several English gas engineers, extracts from two of which letters are appended:

Writing from Salisbury, England, under date of February 4th, 1898, Mr. Norton H. Humphrys says:

"The use of independent generators is gaining ground, though slowly. It has always appeared to me, when standing in front of a row of 10 to 12 beds of retorts, that the space occupied by the furnace would mean two—or at least one—more retorts in each bed, and that a generator at one end or in any convenient position would mean economy. The gases might be cooled somewhat in reaching the setting, but look at the saving in construction and loss by radiation. * * * Many are now using one producer only for a through bench instead of two. * * * I would certainly take up the subject."

Before the Southern District Association last November, Mr. C. C. Carpenter, of Vauxhall, London, presented a valuable contribution entitled "Retort Setting and Retort Heating," which with its discussion appeared in the London *Journal of Gas Lighting*, of November 16th, 1897. Referring to this paper, I wrote to Mr. Carpenter, asking as to any recent developments in producer firing, advocacy of which was its prominent feature. His reply was prompt, and he has courteously permitted its publication.

"THE SOUTH METROPOLITAN GAS COMPANY,
"VAUXHALL, S. E., March 5, 1898.

"Dear Sir: In reply to your letter, I believe the firing of retorts by producer gas supplied from independent producers is one that is bound to come to the front. Since writing my paper I have set to work an installation of inclined retorts, where the producers are quite independent from the retort settings. Owing to the greater head room required by inclined retorts, it appears pretty generally conceded that it is not worth while to put these in so as to allow the coke from the lower ends of the retorts to run direct to the producer—it would mean raising up the whole installation from a datum fixed by the proper height for a producer. I believe that it will be found most advantageous to leave out the question of firing by hot coke; and once free from this, greater latitude is obtained in the design, working and construction of the producer, which is a most important adjunct in a well designed plant. The construction, after all, is one which pertains to most water gas plants.

"The producers at our Bankside works are 15 feet high, and each supplies heating gas through bare cast iron pipes for 48 mouthpieces. The upper part of the producer acts as a self-feeding coke hopper, and as the fuel is cold coke, there is an interchange of temperature between this and the gas rising from the fuel bed proper, with the result that the effluent gas is about 800° F. It passes through a valve box, by which the quantity used can be regulated, and passes into the heating and distributing flues of the setting. The highest required temperatures are obtained in the combustion chambers and maintained with the greatest regularity and evenness. Perhaps the best evidence I can give you of the advantages of the system is the fact that in the more important extensions of retort house plant at other works of this company, the system of using outside producers has been decided upon.

"I hope the information contained above is what you desire, shall be pleased to supplement it in any way possible, and remain,

"Yours faithfully, CHARLES C. CARPENTER.

"G. T. THOMPSON, ESQ., 40 Wall street, New York."

Opportunity having offered for a personal visit to the plants named by Mr. Carpenter, I supplement his description by the following brief account of the producers at the Bankside works (formerly those of the Phœnix Company), whose erection later than the Vauxhall installation may properly be considered to indicate that they embody such improvements as experience with the earlier forms may have suggested.

One-half the retort house is now in operation; the other half, on the same plan, will be completed this year. The benches at present in use are 9 in number, each containing 8 inclined retorts, 20 feet in length by 24 inches wide. Each triplet of benches is fired from a single producer, erected behind the stack some 3 or 4 feet back of the middle setting of each triplet. The producers are rectangular in plan and arched at top (the axes of the arches in the same direction as those of the benches), and there are furnace doors on the two opposite sides of each. As Mr. Carpenter has remarked, the shape of the producer is not material, and its form is naturally adapted to the space at disposal; but in the details of the furnace door the use of a "dead plate" sealed in the water of the ashpan is considered an essential for preventing the ingress of air, except through the primaries and during clinkering.

Through the crown of the producer arch passes a short coaling chute, with self sealing lid at top, this lid being on a level with the platforms from which the retort-charging apparatus is operated. The fuel is thus readily handled by the same man who charges the retorts. A practically uniform depth of fuel is secured by the hopper within the producer, near its top, as more particularly described in Mr. Carpenter's paper, and the same device also causes partial preheating of the coke before it reaches the actual firebed, thus compensating in some measure for the use of cold coke. The producer gas makes its exit into three cast iron pipes of about 14 inches diameter, unjacketed and unlined, leading to the three regenerators beneath the retorts, each inlet controlled by a butterfly valve.

It will thus be realized how simple is the arrangement and how especially adapted to the conditions in question. One producer does the work which would require six furnaces for an equivalent carbonizing capacity in benches of eights.

As to the fuel results obtained, I am unable to speak. It is the custom in the South Metropolitan Gas Company to confine figures of averages to the quantity of coke *sold* per ton of coal carbonized, which leaves two unknown quantities, production and fuel consumption. With engineers of such repute as are those of this great Company we may be sure that they do not depend solely upon this method of computation, nor decide upon the relative economies of different types of benches without careful and thorough tests; but they are conservatively averse to stating results which cannot be maintained in the average life of an average setting, and as their methods of handling coal and coke and the many varieties of coal carbonized would make it difficult and expensive to arrange complete percentage accounting of fuel, they give out no such figures at all.

In spite of the fact that I can not answer this, the first question usually put to the advocate of a departure in furnace construction, it will, I think, be agreed that adoption of the system at all the plants of a Company, especially such a Company as this one, is strong proof that the subject will repay our study and experiment.

Discussion.

The President—Has Mr. Bredel anything to say on this paper?

Mr. Bredel—About four years ago I made a set of outside generators for the Erie (Pa.) gas works. At that time the price of good coke as compared with coal was about as 6 to 10, and as it was necessary to save as much coke as possible I proposed the installation of an outside generator to fire the coal. After putting it up we had many stoppages of the main supply, and, on account of the heavy hydrocarbons which were made, the nostrils of the benches also would stop up. There was too a good deal of trouble in regulating the heat. We could not get a uniform production of gas, and we had frequent stoppages. Then we tried coke, and the result was very satisfactory—that is to say, a consumption of 14 to 16 pounds of coke per 100 pounds of coal carbonized; but with coal it went down to 13 and 14 pounds. Next year we changed the arrangement somewhat, and then we had not so very much trouble to keep the flues clean. They have been running the benches until now, and are using coal. If I were using coal I would put in generators again, but I would purify the gas by sending it first through the scrubbers to eliminate tarry matter and other impurities and gas the by-products. Gas works differ from steel works in the fact that the former are run every day in the year, but the latter only six days in the week, and are idle on the seventh, when there is then a chance of cleaning them out. When it comes to firing coke in the outside generators there is absolutely no advantage whatever. In England, where the yield is between 8,000 and 9,000, and where the coal requires considerably less heat to carbonize it, it is not necessary to have such tremendously high heats under the retorts as in this

country where a yield of 10,000 or 11,000 is often required. With the outside generator the gas comes to the bench practically cold, and if you want to use steam to any amount your flame temperature will be let down, and in such a case your efficiency becomes very low. I am sure that an outside generator will use from 15 to 20 per cent. more coal than a generator inside. With the English or Saar coals it would be different, but with American coals that construction is not desirable, unless you wish to save your coke and burn coal in the generator.

Dr. Moss—I do not think it would make that much difference, because it is just as easy with a proper combustion to get a high temperature as it is to run at a lower temperature. If a generator is detached it seems to me the only difference that could possibly exist would be in the case of inclined retorts, charging them as they do with hot coke, and shooting it directly into the furnace, while the outside generators use cold coke. And yet that is compensated for to some extent, as has been pointed out, by the coke being gradually heated before it gets into the fire proper. If we get complete combustion I do not see why there should be much difference, except in the initial temperature of the gases at the point of combustion, and which could be overcome by mechanical arrangements.

Mr. Weber—I have had some experience with detached generators, but not with any of the type described by Mr. Thompson. I refer to the installation at the works of the Pittsburgh (Pa.) Gas Company, where 20 benches were fired with the Loomis producer gas, and met with great success; also, to the installation in Brooklyn, where the retorts were fired by isolated generators.

Mr. Doherty—I have been more or less interested in this subject, and am an advocate of the system. I think it permits a great saving in labor, and ought to permit a greater utilization of fuel, becuuse we are putting the retorts under the charge of one man, or of one corps of men; and we know that when one generator may be running perfectly well, others may work very imperfectly. I agree with much that Mr. Bredel said in regard to the matter, but I do not think that the gases ought to reach the furnace cold. It is, hower, simply a matter of installation. With large carrying capacity and small area there should be but slight difference in temperature between generator and furnace; and this can be secured by proper installation. I believe this is a system requiring a great deal of attention. It is needless to say that the use of cheaper grades of fuel for firing the benches, cheaper installation and lessened cost of maintenance would afford many advantages, so I will not attempt to argue with Mr. Bredel on that point.

Mr. Bredel—What Mr. Doherty says is all very nice in theory, but such high temperatures in the flues cannot be maintained for the reason that you have to have a check valve in front of each bench, and those valves must be of cast iron, and when those stop up you cannot open or close them with a crowbar. You may rest assured that there will be mechanical difficulties in the way which will be harder to overcome than any theoretical difficulties. As to the cost of installation and maintenance I may say that the cost of installation is possibly higher with outside than with inside generators. The trouble at Erie was that we could not go down so as to put a generator under the bench, otherwise we would have done so. I know of an installation in the Paris gas works where a Siemens producer was put in and installed on a very good plan, with the result that the fuel consumption went right up to 25 pounds or so of coke used for 100 pounds of coal carbonized, and it cost considerable more than the old way of firing.

Mr. Forstall—Being a "theoretical cuss" myself, the practical difficulties mentioned by Mr. Bredel do not appeal to me on this subject; but it struck me that there were some other things in the way. Of course we have Mark Twain's authority that it is best to put all the eggs in one basket, and then to sit down and watch the basket; but even against such good authority I prefer to work the other way. It seems to me that if you have one producer to do the work for one side of a stack of benches you must be certain that that producer will do thorough and efficient work 24 hours per day for the 365 days in the year, otherwise you may have half your generator capacity in a very feeble condition. If you have a separate producer for each bench it is very seldom that all kick at the same time, and so you have only a small percentage of your capacity let down at any one time. Of course it may be possible, and I suppose it is, to get a producer that will work; but we want to be certain that we have got one that will keep the heat uniform before we adopt this system.

Mr. Doherty—I understand Mr. Forstall to say that if he had one producer he would have two; but I do not think anybody would aim to have more than one. If necessary we could have more than one producer, but ordinarily that would not be necessary. The matter of using cheaper fuel in the generator is of very great consideration. It is perhaps largely a matter of geography, but we know there are some places where the application of this system would result in a saving of labor, and at the same time give a better control of the furnace heat.

Mr. Bredel—It does not give better control of the heats, and I know that it requires an expert fireman to handle it. You will not make the same kind of gas, and you will have all kinds of specific gravities at different rates of speed. The moment you decrease your draft the secondary air supply will increase, and the first thing you know you will have a cold bench. I would not advise anybody to do it who can buy a good gas coal cheaply. I would advise him to carbonize more coal, to make more coal gas, and to return the coke to the furnace, or fire the retorts with gas. You can do the work a great deal cheaper in that way than with any outside generator. If you had to fire a steam boiler it would be quite another thing, for then it would not make much difference what the initial temperature might be, for you can use the waste gas until the final temperature drops below 500°. But in a gas bench such a low temperature is of no use. There you want an initial high temperature, and anything below 2,500° F. is of no value for heating retorts. And, besides, that form of generator (the outside) would be too costly for any ordinary gas works, as the cost of a first-class installation would be higher than that of a first-class inside generator recuperative furnace.

Mr. Egner—We all know that the real value of a thing is not always in proportion to its bulk or size. Although Mr. Thompson has given us a very short paper, he has nevertheless given us a great deal to think about. It is a very valuable paper. He has not given us theories but statements of practical results which are well worthy our serious consideration. When the inclined retort system was proposed to the German Society of Gas and Water Engineers, a committee was appointed to investigate the subject, and that committee is still in existence. A report was made at the last meeting, and another will be made at the next. Would it not be advisable for the Western Gas Association to appoint a committee to continue the investigation begun by Mr. Thompson, to correspond with people on the other side, and perhaps obtain drawings of all improvements in this line for the benefit of this Association. Mr. Thompson has very ably presented the subject to us, and I think it would be well to continue the investigation, as it would be something in the direction in which we are all working as an Association. I would suggest, however, that instead of making this effort individually we act together as an Association, as then we would probably receive more attention from the gentlemen to whom we may apply for information. If in order I would move that the President appoint a committee to continue the investigation and report at our next meeting; and let them try to get further data on the subject and present it to us at that time.

The President—Such a motion is not in order at present, but you can make it after the disposition of this paper.

Mr. Thompson—Referring to Mr. Bredel's last remark, that the best way is, if you have a cheap gas coal, to make more coal gas and return it to the furnace, I may say that such an installation is now going up near Boston, with a capacity of about 25,000,000 cubic feet per day. I refer to the Chelsea coke ovens. I did not intend what I have written to be considered as a paper, but simply as a short topic, and I have been greatly surprised as well as gratified at the extent to which the discussion has gone. It seems to me that what we have to consider in this matter is whether the English and the American practices in respect to coal gas differ sufficiently to make the results obtained in England with these producers inapplicable in America. In England most of the gas is coal gas, and owing to the high latitude and the foggy weather, cities of 200,000 inhabitants, for instance, necessarily have gas works equalling in size those of cities in America having three times the population. There are, therefore, a large number of very large gas works in England, and it seems to me that this producer question is applicable only to large gas works. As to Mr. Doherty's suggestion, that you will not need to have two producers, I will say that it is not customary to build these producers so that they can be connected to any one of a series of benches. At any rate that was not the case in the instance which I described in the paper. The producer was combined with the middle one of three benches, and it had connection to only those three benches. If anything happened to the producer, then those three benches would have to be let down. Mr. Forstall's point in that particular is well made, but the cost of construction of the producer is so small, and the necessity for its repair so remote during the length of time that the retorts themselves will last, that I think engineers are justified in extending the installation of producer furnaces. It is true that in England they do not run as high heats as we do; with slightly increased weights of

charges, they run very largely 6-hour charges. As to the Erie installation, to which Mr. Bredel refers, I may say that I saw that plant this last March, and it was running along very nicely, and they were getting good satisfaction with it, although, as he says, they have had a considerable degree of difficulty in regulating it. The evolution of gas was not uniform either in quantity or quality. I think the stoppages and other difficulties were due to the fact that slack coal was used in the generator, and not coke. The suggestion has been made that the gas is likely to be cold when reaching the furnace. Mr. Carpenter has stated that the temperature was about 800° F. He has also stated that the reason the temperature was about what it was, was due to the partial pre-heating of the coke in the heater above the main portion of the fuel bed. The distance from the generator to the middle bench is not over 4 feet, and to the others it is not over 14 feet. I do not think that even for that comparatively short distance it would have paid to line or jacket those pipes, for there must be some loss in temperature by radiation. As to the advantages: It is possible that there may not be any considerable reduction in quantity of fuel used, as compared with high class generators; but, on the other hand, I think it worth while to say in passing that it is very difficult to get at what these high-class generators are really doing for their average work. I have heard figures given as low as 8 pounds per 100 pounds carbonized; but I do not think any of us will agree that such results can be obtained here in the life of a setting.

Mr. Bredel—What kind of coal was the eight pounds?

Mr. Thompson—It was Pittsburg coal. That rate was very low, and I do not think it could be maintained. I believe, however, that the saving of labor to which Mr. Doherty has referred is a very strong point in favor of the use of independent producers, and that the economy of space is also a material advantage.

On motion of Mr. Butterworth, the thanks of the Association were voted Mr. Thompson for his paper.

Mr. Egner—I now renew my motion that a committee of three be appointed by the President to obtain further information on the subject of outside furnaces, the committee to report at our next annual meeting. (Seconded by Mr. Butterworth and adopted.)

The President appointed as such committee, Messrs. Frederic Egner, Irvin Butterworth and Fred. Bredel.

Report of Committee on Final Resolutions.

Mr. Paul Doty, from the Committee on Final Resolutions, read the following report, which was, on motion of Mr. Callender, seconded by Mr. Egner, adopted:

Your committee desires to give expression of appreciation for the kindly reception, and for the entertainment which has been so generously provided for the members of this Association.

Mayor Maybury's welcome was especially pleasing, and we are indebted to him for the freedom of the City of Detroit. The sign which he gave of our profession entitles him to brevet membership in our Association. We think we may fairly vote the Mayor to be a "brick" by reason of his "Irish descent"?

The response by Captain White to the Mayor's welcome was, as his remarks always are, in good taste. The Captain's reference to cocktails reminds your committee that Detroit, which has heretofore been known as the "City of Straits," may fairly be called the "Palate City," in appreciation of the fact it is in the throat of the great body of commerce which passes the city, and likewise the home of the famous concoction of Colonel Croul.

We are appreciate of the tact and courtesy of retiring President Lynn, and to the other of the retiring officers whose efforts have so ably contributed to the success of our meeting, and have pleasure in moving a formal vote of thanks to President Lynn and his associates.

We desire to acknowledge, with appreciation, the work of our Secretary, Mr. Dunbar, in bringing us together and making possible this "feast of reason." To the Central Traffic Association, and other passenger associations who have granted us the usual courtesies of convention transportation, we extend our thanks.

This anniversary meeting, in our twenty-first year, is a peculiarly appropriate time to show our manhood by resolving to publish our proceedings in permanent form. If we have anything worth the saying, and say it well, it is fitting it should be preserved for future reference, and your committee expresses appreciation of the action of the Executive Committee in moving this recommendation, and congratulates the Association on the adoption.

Your committee has much pleasure in formally moving that a vote of thanks be extended to the Committee of Arrangements, who have so generously provided for the social side of the meeting. Their courtesy is characteristic of the open-hearted, free-handed hospitality of the West.

We are grateful to our companies for the opportunity of being present at these meetings, and express our appreciation. These meetings are educational and social—none the less educational because socially enjoyable; the feeling of fellowship is characteristic of the Western Association, and certainly companionship is the sweetest relation in life.

Adjournment.

The President—Before adjourning I wish to thank the members of the Association for their hearty co-operation and assistance in conducting this meeting. I trust that at our meeting in Milwaukee next year there may be an attendance as large and enthusiastic as we had here in Detroit.

We will now adjourn until 11 o'clock to-morrow morning, on board the steamer *Promise*, at some place on the Detroit river.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

A correspondent, writing to the Journal, from the South Station (Providence, R. I.) Gas Company, under date of the 14th inst., says: "In an article on the valuation of ammonia liquors, by Mr. O. O. Thwing, of St. Louis, Mo., published in your last issue, I noted that the normal sulphuric acid is made up as follows: 'To make the normal solution of sulphuric acid, take 26.7 cubic centimeters of candle power acid, 1.84 gravity, etc., etc.' Can you give me any further information in regard to what 'candle power' acid is? I have always used 'chemically pure' acid in making up standard solutions, and never happened to run across that particular brand of acid."

Our correspondent is right, and the types made us wrong. Chemically pure of course is what was meant. Meanwhile we might remark that the use of abbreviations leads to confusion. If our correspondent will kindly inform us of any future typographical mishappenings on our part we will gladly do what we can to put things straight.

The Los Angeles (Cal.) Lighting Company is printing the following notice in the local newspapers: "On July 1, 1898, the price of gas will be reduced to $1.65 per 1,000 cubic feet. Service pipes will be run free of charge. Small cottages will be piped, gas fixtures furnished and hung, and gas stoves sold and connected, at absolute cost, payable in installments of $1 per month."

The annual meeting of the stockholders of the Georgetown (D. C.) Gas Light Company was held at the appointed time, and the following officers were chosen: Directors, John Marbury, S. Thomas Browne, M. J. Adler, William B. Orme, G. L. Nicolson, Wm. A. Leetch and Robt. D. Weaver; President, Henry C. Winship; Secretary and Treasurer, F. P. Leetch; Superintendent, R. L. Middleton.

The authorities of San Francisco have awarded a contract for the lighting of certain public buildings by means of incandescent electric lights to the San Francisco Gas and Electric Company. The minimum rate is 10 cents per 1,000 watt hours; the maximum rate is 15 cents.

The proprietors of the New York, Rutherford and Suburban Gas Company, of Rutherford, Boiling Spring, etc., N. J., have purchased from Charles Hofmann a piece of land, 50 feet by 100 feet, fronting on Van Winkle street, borough of Rutherford.

A correspondent incloses the following, from Charlottetown, P. E. I., under date of the 9th inst.: "The first general meeting of the shareholders in the Charlottetown Light and Power Company, Limited, was largely attended. The following Directors were elected: W. A. Weeks, L. L. Beer, A. E. Ings, Benjamin Heartz and W. C. Pitfield. The Directors subsequently perfected the following organization: President, L. L. Beer; Vice-President, W. A. Weeks; Secretary, A. E. Ings; Engineer and Manager, Henry R. Lordly, C. E. The report of the work done since the new syndicate took hold of the business is highly satisfactory, and shows that the same may be looked for here for gas for lighting and heating as in other cities, and the stock of the new Company will no doubt be found a desirable investment. The balance sheet to date shows that a fair dividend is in prospect for the present year, and this on a daily increasing business. It may surprise some to learn that nearly 50 houses use gas for cooking, and the orders on hand will materially increase this number in a short time. When it is known that cooking by gas for an ordinary family can be done for 8 or 9 cents per day it will not be long before every household of moderate means will use gas in the kitchen. The improvements to the works under the supervision of Engineer Lordly have been of great

assistance to the Company in cheapening the price of gas, and when the plans are fully completed, and the number of consumers increases, the price of gas will be again reduced. The street railway branch of the business has not been overlooked. A British syndicate, which controls a new gas motor, is anxious to be interested, and after Mr. Lordly completes the surveys and the remodelling of the gas plant, he will be sent across the water to consult with the Englishmen for the equipping of the proposed road."

THE Philadelphia *Times* of the 10th inst. says that on the preceding day the Mayor forwarded a communication to the Common Council inclosing an ordinance for the organization of the Bureau of Gas in the Department of Public Safety. Clause 11 of the gas lease ordinance provides that the United Gas Improvement Company shall appropriate $10,000 per annum for the creation and maintenance of a meter inspection department, to be controlled by the city, and it was in accordance therewith that the ordinance submitted by the Mayor was based. It provides for the appointment of a chief inspector of meters, at $5,000 per year; a first assistant, $1,000; a second assistant, $800; a clerk, $1,000; a photometrist, $600; a messenger, $600.

THE authorities of Chico., Cal., have awarded a contract for the public lighting of that place with arc lamps, to the Chico Gas Company. The rate agreed upon is $8 per month per lamp, the lighting table to be on the moonlight scheme, until 12:30.

AT the annual meeting of the Camden (N. J.) Gas Light Company. the following officers were elected: Directors, B. F. Archer, Jno. McIlhenny, R. F. Smith, Samuel C. Cooper and Charles Watson; President, B. F. Archer; Secretary and Treasurer, Charles Watson.

THE Hudson County Gas Light Company, of Hoboken, N. J., is making important main extensions along the northern lines of its territory.

MR. H. C. CORLETTE has resigned the position of Superintendent of the San Bernardino (Cal.) Gas Light Company. His successor is Mr. F. R. Philps, of Los Angeles, Cal.

THE changes named above are accounted for by the statement that the San Bernardino gas plant has been purchased by Mr. Charles R. Lloyd, who controls the electric light system in San Bernardino.

TO-DAY bids will be opened for furnishing work and material for the installation of new gas making apparatus at Randall's Island, this city. The work is to be done under the direction of the Commissioner of Public Charities.

AT the annual meeting of the shareholders IR the Pottstown (Pa.) Gas and Water Company the following officers were elected: Managers, Geo. B. Lessig, William Auchenbach, M. S. Longaker, J. B. Lessig, P. L. Egolf, John W. Storb and Calvin Fegely; President, George B. Lessig; Secretary and Treasurer, J. H. Maxwell.

WE understand that the reconstruction of the Richmond (Ind.) gas works will be carried out under the direction of Mr. M. N. Diall, Superintendent of the Terre Haute (Ind.) Company.

THE Laclede Gas Light Company, of St. Louis, Mo., proposes to extend its mains to the territory known as Grier's subdivision, which is located between Euclid and Marcus and Ashland and St. Louis avenues.

AT the annual meeting of the Dunmore (Pa.) Gas and Water Company the officers elected were: Directors, W. V. S. Thorne, George B. Smith, C. S. Farrer, Henry Beyea and W. D. Decker; President, Geo. B. Smith; Secretary and Treasurer, Henry Beyea; Assistant Secretary and Treasurer, J. T. Frear.

A CORRESPONDENT forwards a copy of the report of the President and Directors of the Ottawa (Canada) Gas Company, for the twelvemonth ended March 31, 1898. We make the following extracts therefrom: "The profit on the year's operations, exclusive of $2,933.63 for repairs and renewals to retort benches, which is charged to revenue account, amounts to $30,257.65, an increase of $2,214.17 over last year. The net profit, after deducting the interest on debentures ($4,866.66), is $25,390.99, out of which the Directors propose to pay a dividend of 7 per cent., amounting to $22,750. The total increase in consumption for the year is 6,678,000 cubic feet, equal to 18 per cent., which we think may be considered eminently satisfactory, especially as the gain was made in competition with electric lighting generated solely by water power; 229 meters were added during the twelvemonth, 108 of which were for light and 121 for heat, making a total of 1,643 in actual service. The cost of manufacture has been very slightly less, but we have reason to believe that our next contracts for coal and oil will be more favorable during the current year, which should show better results in this respect next year. On April 1st, 1898, the commencement of our financial year, the price of gas was reduced from $1.75 to $1.50 to all those using gas exclusively for light. This will make a considerable difference in our income, which we trust will be quite covered, in the course of 18 months, by a greater output. We regret to announce the probability of a great reduction in the revenue hitherto received from the Government buildings, owing to the extension of the electric light, but we believe the extra efforts put forth by all the staff to secure a greater private consumption, which are already bearing good fruit, will soon compensate for this loss. Your Directors contemplate extensions of over 2 miles of 3, 4 and 6-inch mains during the season, and the renewal of some defective pipes; also, an additional tank for oil storage. The works are now in excellent order, and the leakage from mains has been reduced considerably. The Parliamentary Act for converting the $20 shares into $100 stock was duly obtained in June last, and the necessary formalities were afterwards carried through by the shareholders at a special meeting called for the purpose."

THE plant of the St. Hyacinthe (Quebec) Gas Company was slightly damaged by fire, on the night of the 9th inst.

AT the annual meeting of the Frostburg (Md.) Gas and Electric Light Company the officers chosen were: Directors, B. Lowndes, A. E. Hitchins, Joshua Johnson, G. H. Wittig, Hazelhurst Sprigg, Howard Hischins, Charles T. Lowndes, John Sheridan and J. P. Rowan; President, B. Lowndes; Vice-President, A. E. Hitchins; Secretary, Joshua Johnson; Treasurer, G. H. Wittig; Superintendent, Alexander Smith.

THE executive management of the Toledo (Ohio) Gas Light and Coke Company is appended: President, John Cummings; General Manager, Chas. R. Faben, Jr.; Assistant Manager, Thos. B. Guitteau; Secretary, Thos. Biddle; Asst. Secretary, Geo. M. Wheeler.

ANOTHER scheme for an opposition Gas Company at Denver, Col., is underway. The prime movers in "the deal" are said to be Job. A. Cooper and Charles Wheeler.

ACCORDING to Inspector Meeds the average candle power of Minneapolis (Minn.) gas during the month of May was 24.40. Only two meters were tested on complaint during the month noted.

The Market for Gas Securities.

The market for city gas shares, in common with the general market, was very much on the down side last week. As usual, whether the result be up or down, Consolidated led in point of eccentricity. The net outcome of the trading in it for the six days is a loss of 6 points, the bid price at noon to-day (Friday) being 199. Meanwhile it looks that Consolidated is cheap, and it should be remembered that the average level for it during the past four months is a very much higher level than any heretofore recorded during a like comparative period. Of course, quite some stock jobbing is indulged in by people not far from the Company's headquarters, and it is more than possible that "breaks" will occur in the quotations; but investors not over 50 years of age of course may rest content in the belief that they can wait for their profit, at least as long for instance as Mr. Samuel Sloan, who seems to be waiting for his share with his usual fortitude and equanimity.

Mutual sold off a trifle during the week, while Standards were in somewhat better demand. New Amsterdams, of all classes, were also in the improving list. Brooklyn Union opened to-day at 121¼. Western, of Milwaukee, on an increase in the dividend rate, moved up 10 points. Consolidated, of Baltimore, is in good request at 61¾ bid. Peoples, of Chicago, is notably weaker, as also are the various brands of Lacledes. Bay State exhibited unwonted activity last week, and the purchasing account actually managed to push it past four, but lively sales subsequently pulled it back to three and a fraction. There is some rumor of a proposed increase in the capital stock of the Cincinnati Company. Buffalo gas is quoted at 24 to 26, which figure seems to be more than it is worth.

Gas Stocks.

Quotations by Frederic B. Cochran & Co., Brokers and Dealers in Gas Stocks.

20 and 22 Broad Street, New York City.

June 20.

☞ All communications will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	Capital.	Par.	Bid.	Asked.
Consolidated	$36,230,000	100	199	199½
Central	500,000	50		..
" Scrip	220,000	..	100	.
Cental Union, Bonds, 5's	3,000,000	1,000	99½	100
Equitable	4,000,000	100	206	215
Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,500,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	500,000	100	325	335
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co.	13,000,000	100	30¾	31¼
Preferred	10,000,000	100	73½	78
Bonds, 5's	11,000,000	1,000	100	101½
Northern	150,000	50	..	
" Bonds	150,000	1,000	..	
Northern Union, Bonds, 5's	1,250,000	1,000	94½	95½
New York and East River	5,000,000	100	81	88
Preferred	2,000,000	100	112	115
Bonds 1st 5's	3,500,000	1,000	110	112
" 1st Con. 5's	1,500,000	..	105	107
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	139½	142
Preferred	5,000,000	100	158	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	112	114
Yonkers	299,65	500	130	.

DIVIDEND NOTICE.

Office of Welsbach Light Co.,
Drexel Building, Phila., June 8, 1898.

The Directors have this day declared a dividend of One Dollar per share, payable June 25, 1898, to stockholders of record at the close of business June 17th. Checks will be mailed.

1201-2 EDWARD C. LEE, Treas.

DR. MOSS is open to engage with responsible firm as representative, or charge of works. Will advise on all difficulties met with in the manufacture and distribution of Coal, Oil or Water Gas. Terms reasonable.

Address
DR. MOSS,
1178-tf Care this Journal.

SUPERINTENDENT.

An active man wants the management of a gas property. A close manager, especially expert in the handling of Lowe water gas machinery. Member of the American Gas Light Association.

1184-tf "F. J.," care this Journal.

Position Wanted

As Superintendent in Water Gas Plant.

Six years' experience. Reference given.

Address "N.,"
1202-1 Care this Journal.

PHOTOMETER FOR SALE.

Hartley-Bunsen Universal Photometer.

In fine condition. Fitted for measuring both gas and electric lights. Will be sold cheap. Address

RALPH VOSE,
1203-1 25 Sunnyside Street, Hyde Park, Mass.

FOR SALE.

Ten Sections of Second-Hand 20-Inch Hydraulic Main for Benches of Fives.

Address E. H. YORKE, Engineer,
1201-2 Portland Gas Light Co., Portland, Me.

FOR SALE,

One Small Rotary Exhauster, in good repair; exhauster and engine on same bedplate.

Two 5x5 Purifying Boxes, good as new. Also,

Two Steam Pumps, with 1¼-inch suction and 2-inch discharge. Must be sold. Address

CARTHAGE LIGHT COMPANY,
1200-4 Carthage, Mo.

For Sale.

A Small Gas and Electric Light Plant,

in a Southern city of 3,800 inhabitants.

Address FORT WAYNE ELECTRIC CORPORATION,
1097-tf Fort Wayne, Ind

FOR SALE.

Hydraulic, Dip, Branch and Ascension Pipes, Mouthpieces and Lids, for four Benches of 5's and for one Bench of 3 retorts.

Two Coolers, or Air Condensers, each of 150'000 cubic feet capacity.

Multitubular Condenser, shell, 36 in. diameter, with 98 2-in. tubes, 10 ft. 6 in. long.

D-Shaped Tar Extractor, 8 ft. long, 1 ft. 6 in. deep.

Scrubber, 48 in. diameter, 11 ft. 9 in. high. Three man holes, 11 in. by 15 in.

8-inch Center Seal. Four Purifiers, 8 ft. x 6 ft.

KEY CITY GAS CO
1119-tf Dubuque, Iowa.

FOR SALE,

at a bargain,

Two 50-H.P. Otto Gas Engines,

in first-class condition.

Address WOONSOCKET GAS CO.,
1175-tf Woonsocket, R. I.

Iron Roof For Sale.

Dimensions of building, 87 feet in width, 225 feet in length, one story in height; side walls and gables of brick. Building designed for a Machine Shop, but, owing to the failure of the purchaser, the Iron Roof Trusses are now offered for sale at a bargain. The Roof is admirably adapted for a Machine Shop, Car Barn, Paper Mill, or for any other general manufacturing purposes. Apply to the

Berlin Iron Bridge Company,
EAST BERLIN, CONN.

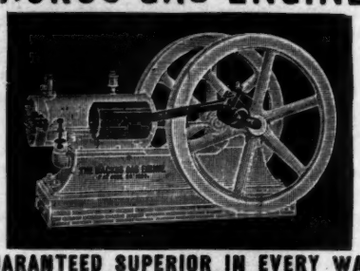
Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator.

Not Expensive. Write to STRCH & OSIUS, Pat'ees. or Mich. Ammonia Works, Detroit, Mich.

BACKUS GAS ENGINES



GUARANTEED SUPERIOR IN EVERY WAY. BUILT ON HONOR.

Agts. { Chicago Water Motor & Fan Co., 101 Lake St., Chicago.
Michell & Co., - - 154 Congress Street, Boston, Mass
Home Office, Backus Water Motor Co., Newark, N. J.

Send for Catalogue.

What's good for Thomas J. Manufacturer is good for the Terzah Ann Gas Company, as the Widow Bedott might have put it; or, as Mr. C. W. Blodget, in his paper before the Western Gas Association, put it: "Has the gas man ever done anything commensurate with the manufacturer to help his own business? How many of us can answer otherwise than in the negative the very pertinent question which a prominent advertiser asks, to wit, 'Have you ever actively given us any support in our efforts in your behalf'?"

Now, let me "put it" modestly, yet confidently. I believe that an adequate, well considered advertising policy suited to the individual locality will go further to increasing dividends on stock of Gas Companies than any other possible form of investment. To make a judicious plan for advertising and carry it out economically requires skill and experience.

For this purpose I am at your service and I invite correspondence. (See page advertisement in issue of this paper of June 13.)

Yours truly

J. A. RICHARDS,
ADVERTISING.

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Phone, 721 Certlan it.
P. O. Box, 2283.

KENTUCKY CANNEL COAL, FOR GAS AND DOMESTIC USE.

GEO. R. HISLOP, F.C.S., F.R.S.S.A., Gas Engineer of Paisley, Scotland, says in his analysis: "This is a remarkably rich Cannel Coal, yielding illuminating matter per ton equivalent to 1,945 lbs. of sperm candles." This coal mined and shipped in box cars. Write for sample car and delivered price.

The Greasy Creek Cannel Coal and Tramway Co.,

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THE ANDERSON Patent Cutter Carrying Link
Made in all sizes.
Will cut from 2 in. to 24 in.
Pipe Cutting Tool

For Cutting Cast, Wrought Iron, Gas & Water Pipes.
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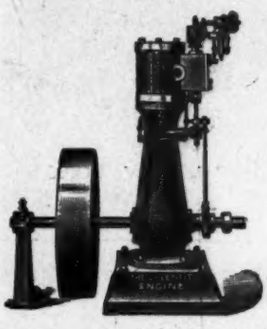

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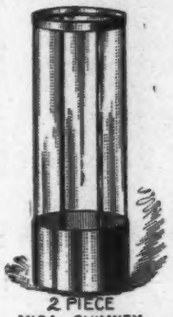

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Pantaclinal Mains, Fittings and Service Connections, are revolutionary of engineering practice in gas distribution. They accommodate expansion and contraction through the widest range of natural temperatures. They are not affected by unequal settlement, frost upheaval, earthquake shock, contiguous excavation, blasting, jar or vibration. They are gas tight when laid, and remain gas tight during the life of pipes in the ground.

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INCANDESCENT GAS LIGHT.

American Patent No. 575,262, of December 1, 1897.

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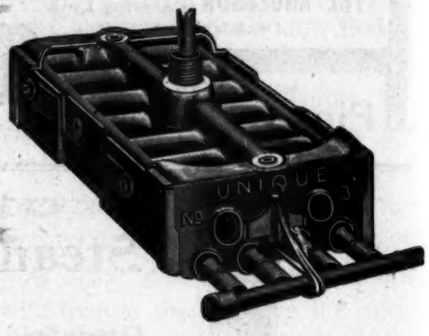

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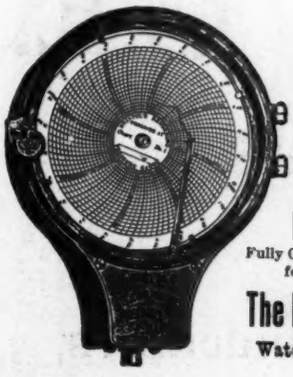

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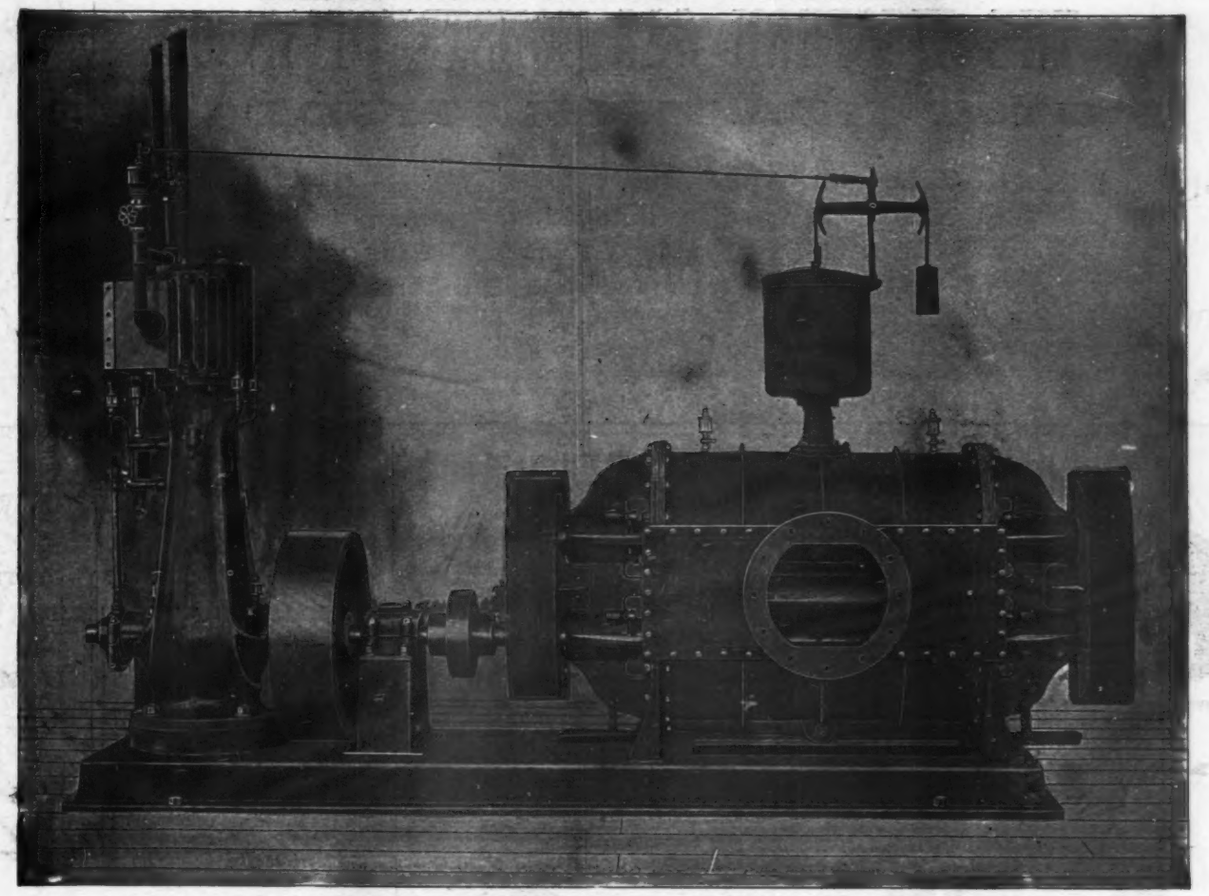

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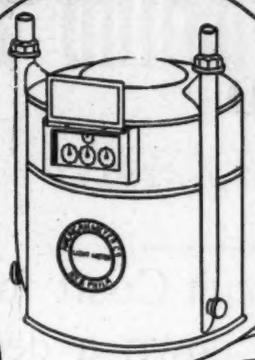

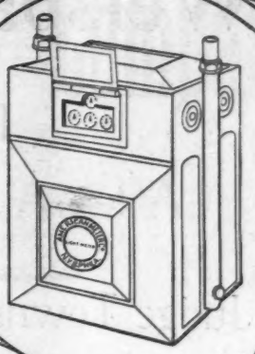

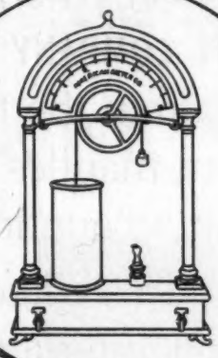

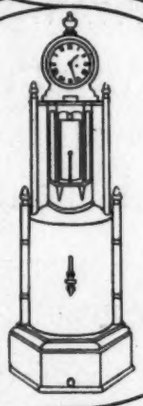

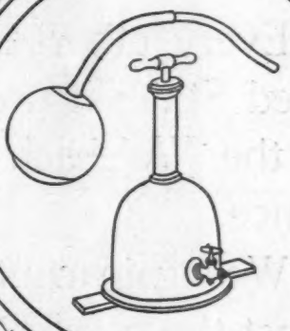

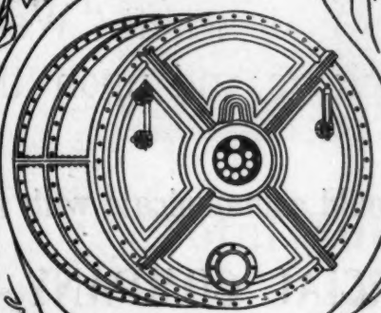

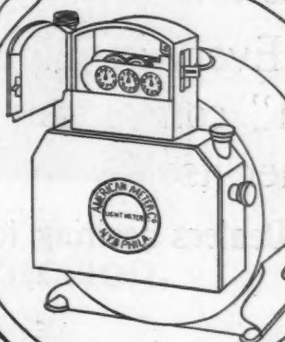

PUBLIC LIGHTING TABLE.

JULY, 1898.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Fri.	1	1.50 AM	3.30 AM	7.30	3.15
Sat.	2	No L.	No L.	7.30	3.15
Sun.	3	No L. FM	No L.	7.30	3.15
Mon.	4	No L.	No L.	7.30	3.15
Tue.	5	8.00 PM	10.00 PM	7.30	3.15
Wed.	6	8.00	10.30	7.30	3.15
Thu.	7	8.00	11.00	7.30	3.15
Fri.	8	8.00	11.20	7.30	3.15
Sat.	9	8.00	11.50	7.30	3.15
Sun.	10	8.00 LQ	12.10 AM	7.30	3.15
Mon.	11	8.00	12.40	7.30	3.15
Tue.	12	8.00	1.20	7.30	3.15
Wed.	13	8.00	2.00	7.30	3.15
Thu.	14	8.00	2.40	7.30	3.15
Fri.	15	8.00	3.40	7.30	3.15
Sat.	16	8.00	3.40	7.20	3.15
Sun.	17	7.50	3.50	7.20	3.15
Mon.	18	7.50 NM	3.50	7.20	3.15
Tue.	19	7.50	3.50	7.20	3.15
Wed.	20	7.50	3.50	7.20	3.15
Thu.	21	7.50	3.50	7.20	3.15
Fri.	22	7.50	3.50	7.20	3.15
Sat.	23	8.30	3.50	7.20	3.15
Sun.	24	9.00	3.50	7.20	3.15
Mon.	25	9.30	3.50	7.20	3.15
Tue.	26	10.00 FQ	3.50	7.20	3.15
Wed.	27	10.40	3.50	7.20	3.15
Thu.	28	11.30	3.50	7.20	3.15
Fri.	29	12.40 AM	3.50	7.20	3.15
Sat.	30	1.50	3.50	7.10	3.30
Sun.	31	No L.	No L.	7.10	3.30

TOTAL HOURS LIGHTING DURING 1898.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	210.40	January	423.20
February	186.40	February	355.25
March	181.20	March	355.35
April	166.10	April	298.50
May	156.40	May	264.50
June	144.30	June	234.25
July	147.30	July	243.45
August	157.10	August	280.25
September	169.50	September	321.15
October	186.00	October	374.30
November	204.30	November	401.40
December	218.30	December	433.45
Total, yr.	2129.30	Total, yr.	3987.45

Welsbach Patent Sustained.

INJUNCTION GRANTED.

Judge Townsend, in the United States Circuit Court for the Southern District of New York, has handed down a decision sustaining the Welsbach Light Company's Rawson patent, and adjudged **THE SUNLIGHT INCANDESCENT GAS LIGHT COMPANY** to be an infringer. This Company has been enjoined from the further use of its method of manufacture of incandescent mantles or the sale or use of the same, and ordered to render an accounting.

A further decision has been handed down by Judge Lacombe in the United States Circuit Court, granting a motion for a similar injunction against **THE REX INCANDESCENT LIGHT COMPANY.**

Every other manufacturer of incandescent mantles in the United States is under these decisions an infringer of this patent, and the Welsbach Light Company will proceed against them at once.

We again caution gas companies and the public generally against the purchase of any incandescent mantle other than that made and sold by the Welsbach Light Company or its agents.

Every genuine Welsbach lamp has the trade mark "Welsbach" conspicuously printed upon the package and upon the burner itself.

Dealers desiring to handle the genuine article should communicate with the

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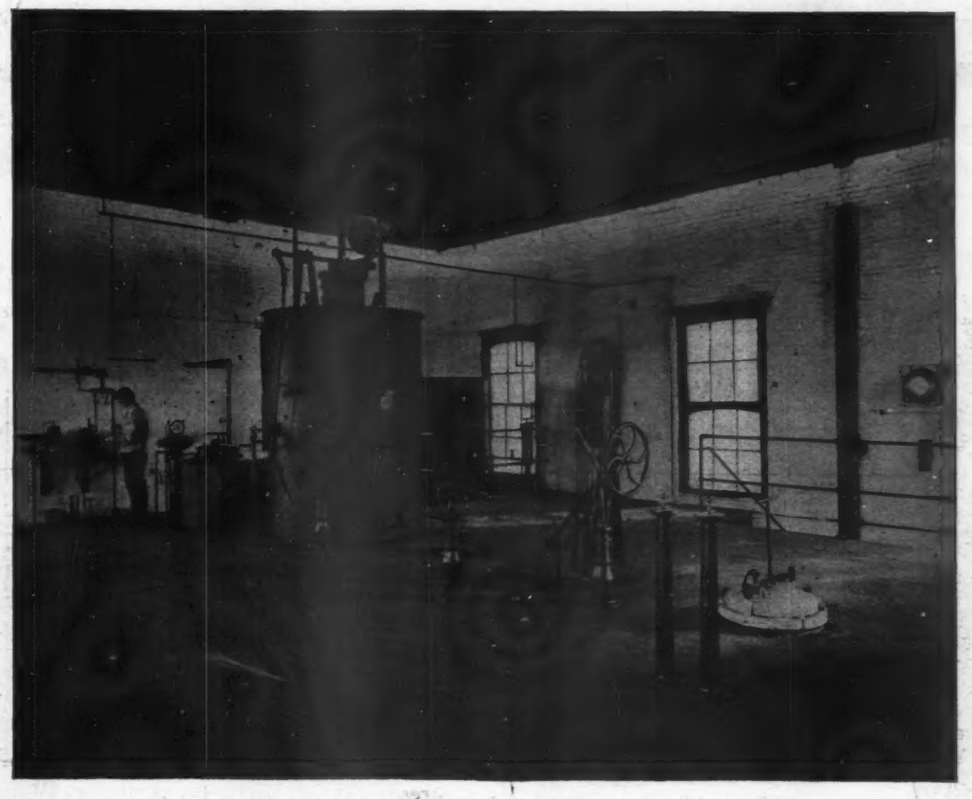
DREXEL BUILDING, PHILA., PA.

The Standard Junior,

The Standard Double Superheater,

LOWE WATER GAS APPARATUS.



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GASHOLDERS, with or without Steel Tanks.

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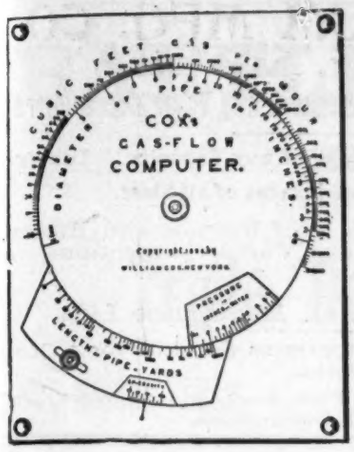

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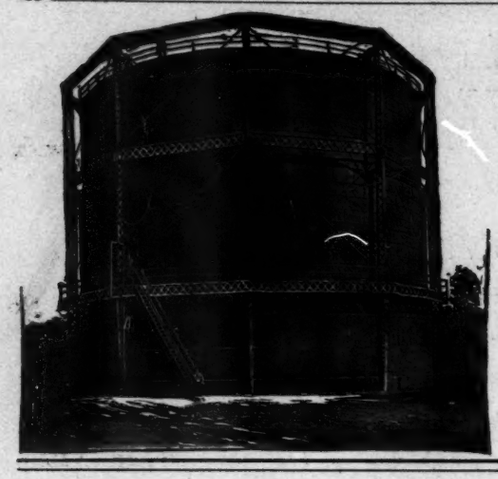

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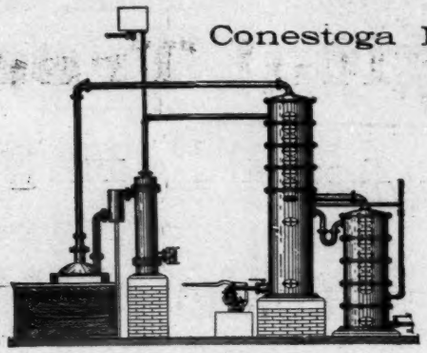

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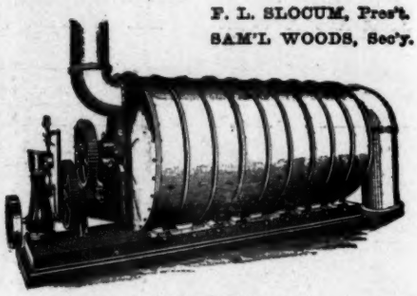

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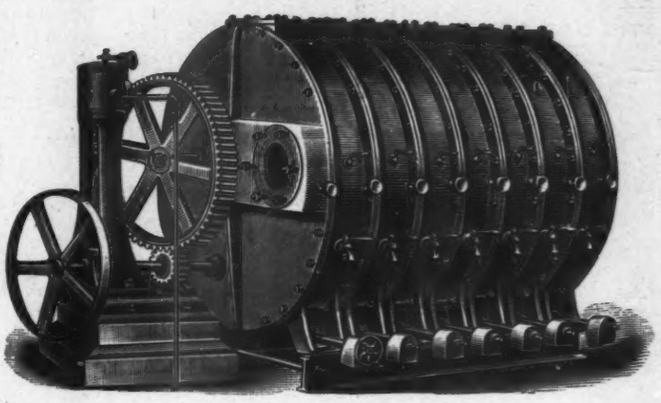

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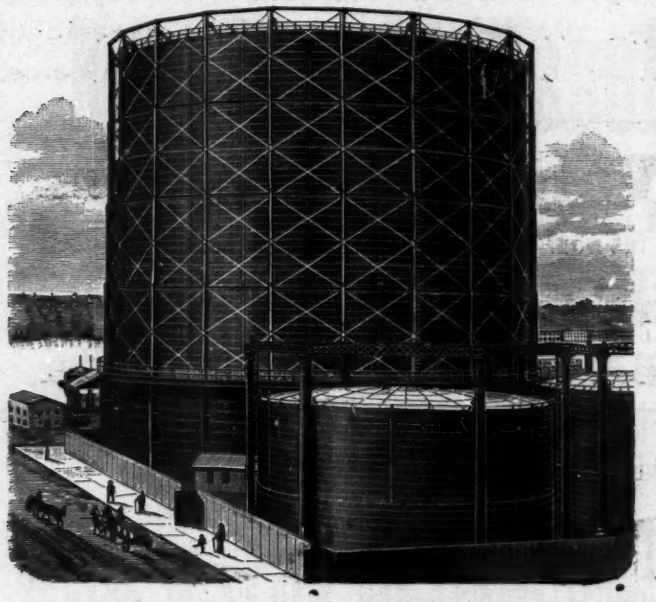

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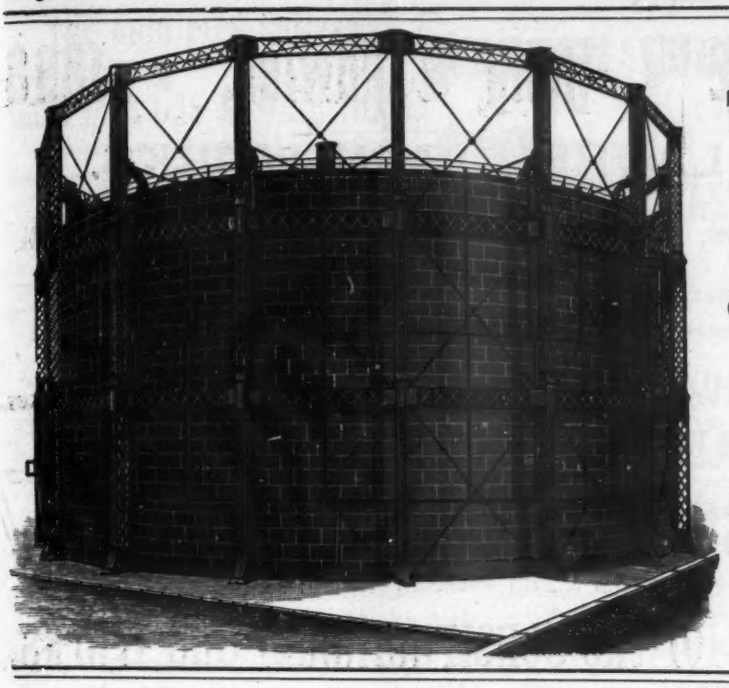

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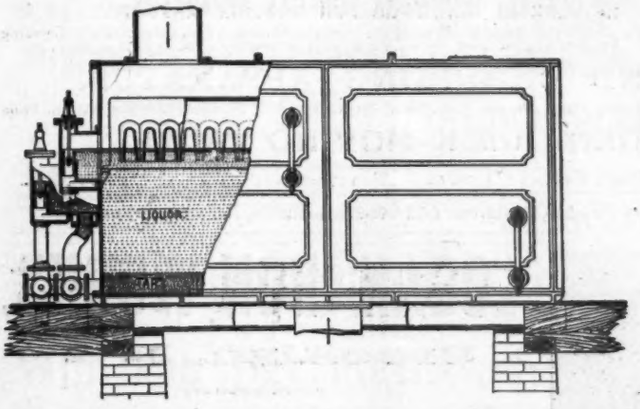

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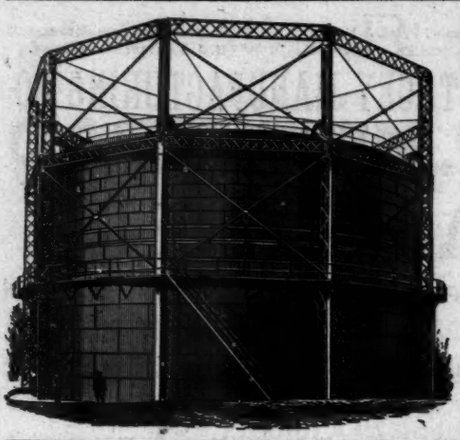

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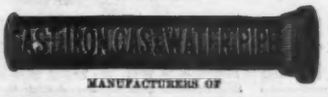

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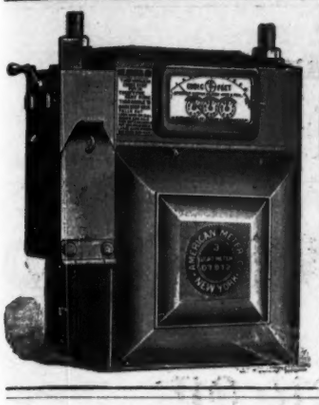

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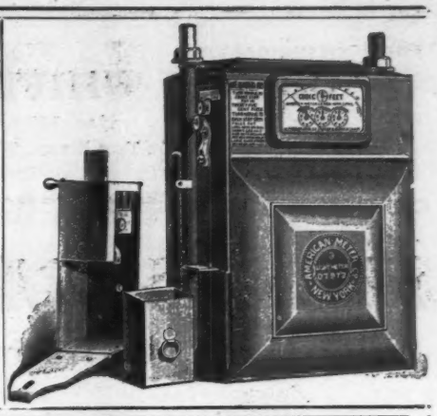

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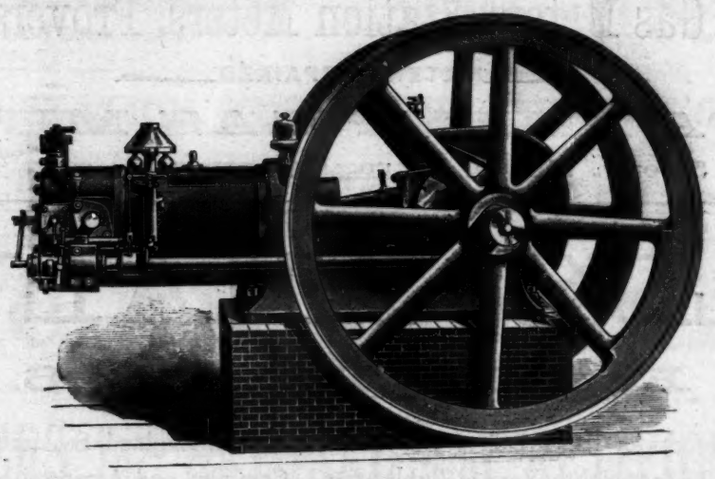

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